IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Inventors: Castillo, Gerrado M	Examiner: Fay, Zohreh A
Serial No.: 09/748,748	Group Art Unit: 1612
Filing Date: 12/26/2000	Attorney Docket No.: P25US2

Title of Invention: Polyhydroxylated aromatic compounds for the treatment of amyloidosis and α-synuclein fibril diseases

Sept 20, 2010

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Commissioner for Patents
PO Box 1450
Alexandria, VA 22313-145

APPEAL BRIEF OF APPELLANT

This is an appeal from a final rejection in the Final Office Action dated 06/15/2010 rejecting Claims 1-3, 17-26 and 29-30. A Notice of Appeal was filed August 5, 2010. An amended claim set was submitted on Sept 16, 2010 to place the claims in better form for Appeal as per 37 CFR 41.33(a). Attached is authorization to withdraw the requisite Appeal Brief fee from our deposit account.

I. REAL PARTY IN INTEREST 37CFR 41.37(c)(1)(i)

The patent application in the case appealed is wholly owned by ProteoTech Inc. who is therefore believed to be the real party in interest.

II. RELATED APPEALS AND INTERFERENCES 37CFR 41.37(c)(1)(ii)

A notice of appeal was filed on Aug 5, 2010 in related continuation application 11/710,228. No decision has been rendered.

III. STATUS OF CLAIMS 37CFR 41.37(c)(1)(iii)

On April 1, 2010 in a response to an office action, Applicant submitted a complete listing of claims in which claims 1-3, 17-21, 25, 26 and 29-30 were pending. In the Final Office action dated 06/15/2010, claims 1-3, 17-26, 29 and 30 were twice and finally rejected. An amended claim set was submitted on Sept 16, a copy of which is enclosed, containing amended Claim 1 and dependent claims 2, 3, 17-19, 21, and 25 . Applicant respectfully submits that the rejected claims are now in better form for review by the Board of Appeals as per 37 CFR 41.33(a). Claim 1 was amended to remove reference to subject matter related to previously cancelled subject matter and to remove reference to the list of individual compounds. Dependant claims 20, 26, 29 and 30 were canceled.

The status of claims on appeal, taking into consideration the Sept 16, 2010 amendment (attached) is as follows:

Pending claims: 1-3, 17-19, 21, and 25

Canceled claims: 4 to 16, 20, 22-24, 26-30

Rejected claims: 1-3, 17-26, 29 and 30

Allowed claims: none

Withdrawn claims: none

Amended claims: 1

Claims appealed: Independent claim 1 and dependent claims 2, 3, 17-19, 21, and 25.

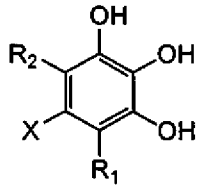
IV.STATUS OF AMENDMENTS 37CFR 41.37(c)(1)(iv)

A copy of the separate document (dated Sept 16, 2010) containing amendments to the claims is submitted herewith for the purpose of presenting the rejected claims in better form as allowed by 37 CFR 41.33(a). In claim 1, elements related to previously deleted subject matter have now been deleted and claims 20, 26, 29 and 30 are canceled. All amendments are filed separately herewith; there have been no interviews with the Examiner.

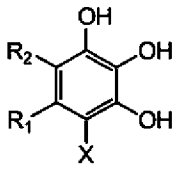
V. SUMMARY OF CLAIMED SUBJECT MATTER 37CFR41.37(c)(1)(v)

The independent claim on appeal is claim 1; there are no means-plus-function claims. The single independent claim and all dependent claims will be argued as a group and claim 1 is reproduced below with reference to subject matter where it appears in the specification by page and line number or figure number.

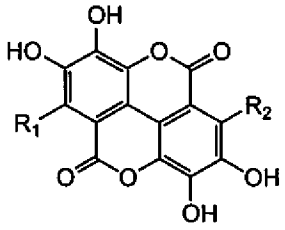
1. A method of treating Alzheimer's disease, [page 21, line 7 to page 26, line 18] in a mammal suffering there from, comprising administration to the mammal [page 17, line 1 to page 21, line4] of a therapeutically effective amount of an isolated pure compound selected from the group consisting of the compounds of formula A, formula B, and formula D: [page 21 line 7 to page 23, line 15, table 1 on page 23]



Formula A



Formula B



Formula D

where:

R_1 and R_2 are independently selected from hydrogen, halogen, C_{1-6} alkyl and C_{1-6} alkoxy; [page 8 line 4 and page 13, lines 16-19]

X is selected from hydrogen and the group consisting of

(a) hydroxy, amino, C_{1-6} alkylamino, di(C_{1-6} alkyl)amino, and cycloamino, [page 8 lines 5-6]

(b) C_{1-22} alkyl, C_{1-22} alkoxy, C_{1-22} alkylthio, and C_{1-22} alkylcarboxyl, each optionally substituted with 1 to 5 moieties selected from the group consisting of halogen, hydroxy, mercapto, amino, nitro, C_{1-6} alkoxy, C_{1-6} alkylthio, and C_{1-6} alkylcarboxyl, [page 8 lines 7-9]

(c) aromatic and heteroaromatic groups substituted with 3 adjacent hydroxy groups, and optionally substituted with 1 to 5 substituents selected from halogen, C_{1-6} alkyl and C_{1-6} alkoxy, each optionally substituted with up to 5 halogen atoms,[page 8 lines 10-11]

(d) sugars, optionally substituted with one or more anionic groups selected from sulfate, phosphate, phosphonate, carboxylate, and sulfonate groups, [page 8 lines 12-13]

(e) peptides, [page 8 line 14] but excluding pyrogallol, and pharmaceutically acceptable salts thereof.

VI. ISSUES TO BE REVIEWED ON APPEAL

Rejection of Claims 1 - 3, 17-19, 21 & 25 under 35 U.S.C. 103(a) in view of U.S. Patent No.5,972,923 (Simpkin's)

Whether claims 1 and dependent claims 2, 3, 17-19, 21, and 25 are patentable under 35 USC 103(a) as non-obvious in view of US patent No. 5,972,923 (hereinafter to be referred to as 'Simpkins'). Appellant is only going to argue the limitations of claim 1 and thereby group dependent claims 2, 3, 17-19, 21, and 25 to stand or fall with independent claim 1.

STATEMENT OF FACTS

1. In the Final Action dated 06/15/2010 it alleges that,

> "The prior art teaches the use of flavanoids within the scope of the claimed genus for the treatment of AD. Applicant cancels such compounds in order to overcome the prior art rejection. However it would have been obvious to a person skilled in the art to substitute one flavanoid for another and use it for the treatment of AD."

2. In the Final Action on page 2, reference is made to additional remarks on pages 2-4 of the previous office action dated Dec 16, 2009. The pertinent allegation is in a single paragraph on page 3, where it states (our emphasis):

> "Simpkins et al. teach the use of falvanoids, such as quercetin and kampferol for the treatment of Alzheimer's disease. See column 5, linesl-12 and 39-42. The above reference makes clear that *polyphenols* within the scope

of independent claims have been previously used for the treatment of Alzheimer's. The substitution of one *polyphenol*, *flavanoid* for another within the same genus would have been obvious to a person skilled in the art. Applicant in the previous response cancelled quercetin and kampferol from the dependent claims. *It is the examiner's position that the cancelled components were within the genus of the independent claims.* Therefore, the prior art teaches compounds within the scope of the genus of the independent claims have been previously used for the treatment of Alzheimer's. Therefore, the substitution of one flavanoid for another within a genus would have been obvious to a person skilled in the art."

ARGUMENT

MPEP § 2143 states that "[t]he key to supporting any rejection under 35 U.S.C. 103 is the clear articulation of the reason(s) why the claimed invention would have been obvious. The Supreme Court in *KSR* noted that the analysis supporting a rejection under 35 U.S.C. 103 should be made explicit" (emphasis added). According to MPEP § 2143, rationales that may support a conclusion of obviousness include the simple substitution of one known element for another to obtain predictable results. MPEP also requires that some rationale be provided in order to support a conclusion of obviousness. In this

case,the Office Action has failed to present any type of rationale other than the allegation that a simple substitution would be obvious to the skilled person. In particular, the rejection lacks a clear articulation of the reasons why such a substitution would allegedly have been obvious and, therefore, the rejection cannot be supported per the requirements set forth by the United States Supreme Court in the *KSR* decision. Thus, it is respectfully submitted that the rejection is improper and must be dismissed.

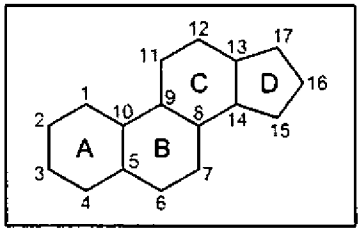
In the absence of explicit rationale Applicant takes this opportunity to logically refute the conclusory allegation that the skilled person, in view of Simpkins, would be motivated to use phenols, by simple substitution, to treat Alzheimers and would have a reasonable expectation of success.

1. Review of the Prior Art

Simpkins teaches methods and compositions for enhancing cryoprotective/neuroprotective effects of polycyclic phenolics through the synergistic interaction with antioxidants.

Polycyclic Phenolics

Initially Simpkins uses the term polycyclic phenolics to describe estrogen and estrogen-like compounds [column 2, lines 27-30]. More specifically polycyclic phenolic compounds are described in column 4 on lines 17-60 as compounds having a phenolic A ring. The skilled person would understand that an 'A' ring is the nomenclature associated with steroids (including estrogen). The steroid skeleton is a fused ring system comprised of three cyclohexane rings (A, B, and C) and one cyclopentane ring (D ring) (see illustration below) [see attached evidence in the section entitled '*EVIDENCE APPENDIX (37 CFR 41.37 (c)(1)(ix))'* labeled as 'Steroids'].



Simpkins indicates that polycyclic phenolics must have a phenolic A ring and can possess additional substituents as set out in subparagraphs (a) to (c) in column 4 lines 25-60.

Antioxidants

Antioxidants, as indicated by Simpkins, can be drawn from a wide variety of different types of compounds including [column 2, lines 28-35] eight different classes comprising: thiols, phenols, spin

trapping agents, aromatic amines, carotenoids, flavonoids, selenium aminosteroids and ubiquinones. Simpkins also uses as antioxidants; glutathione, ascorbic acid, tocopherol, taurine, and lipoic acid, shown in Examples 1-3 (column 8, line 25 to column 12, line 40).

Specifically antioxidants which are either phenols or flavonoids are at issue.

-Flavanoids

Flavanoids are described in Simpkins at column 5 at lines 9-12 and include (+)-catechin, dihydroquercetin, hesperetin, texasin, biochanin A, kaempferol, quercetin and 6,7-dihydroxy-4'-methoxy-isoflavanol. The structures of each example listed above are shown in the section entitled '*EVIDENCE APPENDIX (37 CFR 41.37 (c)(1)(ix))'* labeled as 'Flavonoids disclosed by Simpkins'.

-Phenols

Beginning in column 4 at line 67 and continuing to column 5 line 5 phenols are further indicated by Simpkins as including: probucol, salicylates, Trolox C, 3,4-dihydroxytoluene, 3,4-dihydroxycinnamic acid, nordihydroxyquaiarectic acid, 2"4'-dihydroxyacetophenone, 2',5'-dihydroxyacetophenone, 3',4'-dihydroxyacetophenone and

propylgallate. The structures of each compound listed above are shown in the section entitled '*EVIDENCE APPENDIX (37 CFR 41.37 (c)(1)(ix))'* labeled as 'Phenols disclosed in Simpkins'.

2. Differences between the claimed invention and the prior art

i. Flavonoids

Claim 1 of the pending application was previously amended to specifically remove reference to flavonoids by omitting formula 'C' (flavonoid backbone) and all individually listed compounds which resemble the flavonoids kaempferol and quercetin. This claim has now been further amended to remove all of the individually listed compounds. Therefore the scope of the claimed invention now encompasses compounds of formulas A, B and D does not encompass any compounds which are flavonoids. It is therefore difficult to understand the Examiners contention, as stated in the Final Action, that *"... it would have been obvious to a person skilled in the art to substitute one flavanoid for another and use it for the treatment of AD."*

Applicants respectfully submit that as the instant claims exclude the entire genus of disputed compounds (flavonoids) and the

application of Simpkins to support a finding of obviousness in this instance is therefore incorrect.

ii. Polyphenols

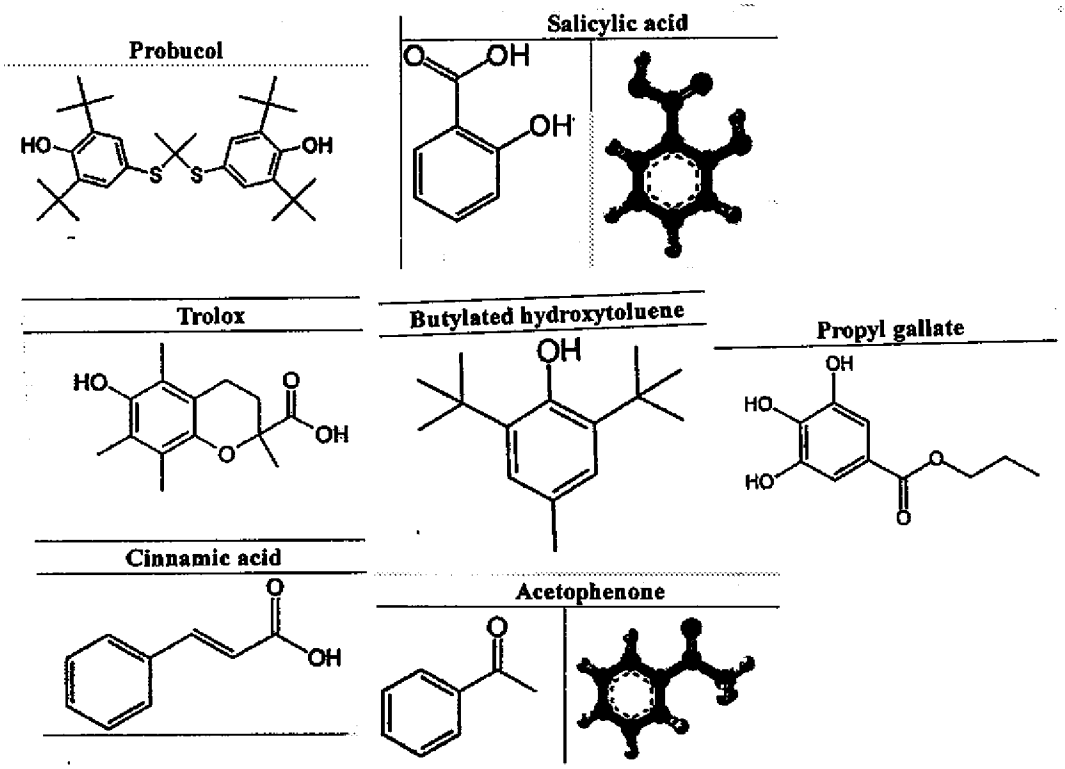
The Office Action dated 12/16/09 uses the term 'polyphenols' which is inaccurate in view of Simpkins since clear reference is made to two quite different types of phenolics. Simpkins first makes reference to 'polycyclic phenolics' used to describe the estrogens and estrogen like compounds. The second term 'phenols' is used by Simpkins to describe a subclass of antioxidants. To best address the complete complete of the stated rejection Applicant has interpreted 'polyphenols' as used in the Office Action to encompass both types of compounds described by Simpkins.

Turning first to Simpkins' polycyclic phenolics, it is clear that the claimed invention in no way encompasses compounds related to estrogens or steroids. None of the claimed compounds possess the steroid backbone containing rings A-D as illustrated above. Although compounds of formula D of the claimed invention have a backbone which is four fused rings, the rings are fused in a different configuration from the polycyclic phenolics of Simpkins. Claimed Formula D compounds are comprised of four fused cyclohexanes, not

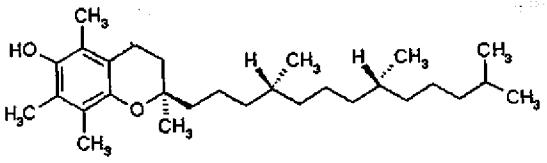
three and additionally two of the rings possess a heteroatom. There are also two carbonyl groups on two of the rings which is different from the polycyclic phenolics of Simpkins. Applicant submits that the skilled person would readily appreciate that the polycyclic phenolics of Simpkins are not encompassed by the claimed invention and therefore a 'simple substitution' is not possible.

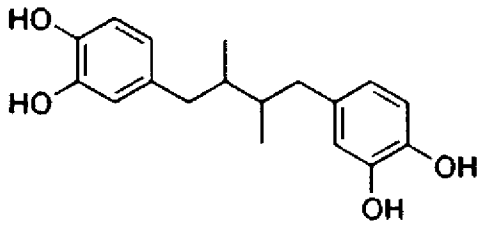
Simpkins teaches that one subclass of antioxidants could be phenols. Simpkins does not define phenols but it would be understood by the skilled person that phenols are compounds containing a six-membered aromatic hydrocarbon ring bonded directly to a hydroxyl group. The definition of 'phenol' in Wikipedia contains a link to 548 pages listing many different phenols. Each page of the 548 pages lists on average 132 compounds. The skilled person would appreciate that a total of over 72,000 different compounds can be considered to be phenols. A copy of the first 3 pages of the 548 pages of this definition in included in the section entitled '*EVIDENCE APPENDIX (37 CFR 41.37 (c)(1)(ix))*' labeled as 'Phenol definition'.

Simpkins more specifically teaches that the following phenols are useful as antioxidants.



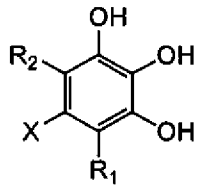
File:RRR alpha-tocopherol.png



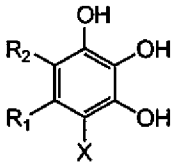


Nordihydroguaiaretic acid

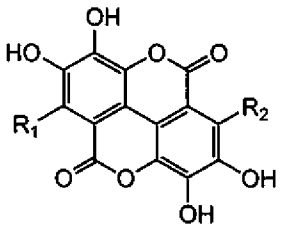
The skilled person will appreciate that none of the specific compounds taught by Simpkins fall within the scope of the claimed invention. The claimed compounds as set out in claim 1 involve compounds of formulas A, B and D which include the following basic structures:



Formula A



Formula B



Formula D

Although Simpkins teaches a trihydroxylated propyl gallate this is outside of the scope of the claimed invention as the claims do not permit that the X or R_1 substitutents on formulas A or B can be esters. It would be appreciated by the skilled person that none of the phenols specifically disclosed by Simpkins fall within the scope of the claimed invention in contrast to what is incorrectly alleged in the Final Action.

Applicant submits that the skilled person would firstly not be motivated to conduct a simple substitution of one phenol for another as the category of phenols is very broad. Secondly the skilled person would have no reasonable expectation of success.

In order to substitute one phenol for another the skilled person would initially be faced with the choice of one of the eight different classes of compounds which are taught for use as antioxidants. The antioxidants actually tested by Simpkins [column 9, table 1] further include compounds which are sugar acids, organic acids, organo-

sulfur compounds and peptides. Only the peptide, glutathione (GSH), demonstrates decent results suggesting its potential use as an antioxidant.

If the skilled person ignored the data and decided instead to proceed with a phenol they would be faced with a tremendously broad and varied group of compounds as discussed above. Simpkins only teaches the use of one phenol, tocopherol, as an antioxidant. Given the scarceness of direction regarding the choice of a phenol, the skilled person would be left with the overwhelming choice of over 72,000 phenols to select from in order to substitute one phenol for another as suggested by the Examiner. Testing the complete list of phenols for antioxidant activity according to the methods presented in Simpkins would indeed be an onerous affair requiring great expense and time. Each of the 72,000 phenols would require a preliminary dose response evaluation, the method of which was not disclosed in Simpkins, to narrow the dosage range to be tested in the assay. The laborious assay itself would then be needed to be conducted for each of the 72,000 different phenols. Therefore, Applicant submits that the skilled person would firstly not be motivated to conduct a simple

substitution and that secondly the skilled person would have no reasonable expectation of success.

In conclusion, the Applicant respectfully submits that proper rationale was not provided in order to support a conclusion of obviousness and thus, the rejection is improper and must be dismissed.

The Applicant further submits that Simpkins has been mischaracterized which has led to incorrect allegation that the claimed invention encompasses the compounds taught by Simpkins.

Finally the Applicant submits that simply substituting any phenol from that vast genus would not yield predictable results nor would the skilled person have a reasonable expectation of success.

In view of these deficiencies and ill reasoned allegations, Applicant respectfully requests the Board overturn the Examiner's rejection of the claims.

Respectfully submitted,

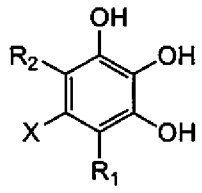


Rebecca Eagen,
Reg. No. L0386

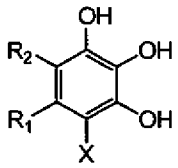
VII. CLAIMS APPENDIX (37 CFR 41.37 (c)(1)(viii))

Claims on Appeal:

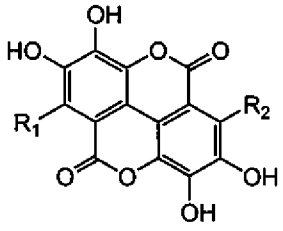
1. A method of treating Alzheimer's disease, in a mammal suffering there from, comprising administration to the mammal of a therapeutically effective amount of an isolated pure compound selected from the group consisting of the compounds of formula A, formula B, formula C, and formula D:



Formula A



Formula B



Formula D

where:

R_1 and R_2 are independently selected from hydrogen, halogen, C_{1-6} alkyl and C_{1-6} alkoxy;

X is selected from hydrogen and the group consisting of

(a) hydroxy, amino, C_{1-6} alkylamino, di(C_{1-6} alkyl)amino, and cycloamino,

(b) C_{1-22} alkyl, C_{1-22} alkoxy, C_{1-22} alkylthio, and C_{1-22} alkylcarboxyl, each optionally substituted with 1 to 5 moieties selected from the group consisting of halogen, hydroxy, mercapto, amino, nitro, C_{1-6}

alkoxy, C_{1-6} alkylthio, and C_{1-6} alkylcarboxyl,

(c) aromatic and heteroaromatic groups substituted with 3 adjacent hydroxy groups, and optionally substituted with 1 to 5 substituents selected from halogen, C_{1-6} alkyl and C_{1-6} alkoxy, each optionally substituted with up to 5 halogen atoms,

(d) sugars, optionally substituted with one or more anionic groups selected from sulfate, phosphate, phosphonate, carboxylate, and sulfonate groups, and

(e) peptides,

but excluding pyrogallol,

and the pharmaceutically acceptable salts thereof.

2. The method of Claim 1 where only one active ingredient compound is administered.

3. The method of Claim 1 where the mammal is a human.

17. The method of Claim 1 where R_1 and R_2 are independently selected from the group consisting of hydrogen; C_{1-6} alkyl, C_{1-6} alkoxy, and C_{1-6} alkylthio, in each of which the alkyl group is optionally substituted with 1 to 5 halogen atoms; and halo.

18. The method of Claim 1 where X is selected from hydrogen and the group consisting of

(a) hydroxy, amino, C_{1-6} alkylamino, di(C_{1-6} alkyl)amino, and cycloamino,

(b) C_{1-22} alkyl, C_{1-22} alkoxy, C_{1-22} alkylthio, and C_{1-22} alkylcarboxyl, each optionally substituted with 1 to 5 moieties selected from the group consisting of halogen, hydroxy, mercapto, amino, nitro, C_{1-6} alkoxy, C_{1-6} alkylthio, and C_{1-6} alkylcarboxyl, and

(c) aromatic and heteroaromatic groups substituted with 3 adjacent hydroxy groups, and optionally substituted with 1 to 5 substituents selected from halogen, C_{1-6} alkyl and C_{1-6} alkoxy, each optionally substituted with up to 5 halogen atoms.

19. The method of Claim 1 where X is selected from hydrogen and the group consisting of hydroxyl and amino.

21. The method of Claim 1 where the compound is a compound of formula A or formula B, or a pharmaceutically acceptable salt thereof.

25. The method of Claim 1 where the compound is a compound of formula D or a pharmaceutically acceptable salt thereof.

IX. EVIDENCE APPENDIX (37 CFR 41.37 (c)(1)(ix))

a. Steroids

b. Flavonoids disclosed in Simpkins

c. Phenols disclosed in Simpkins

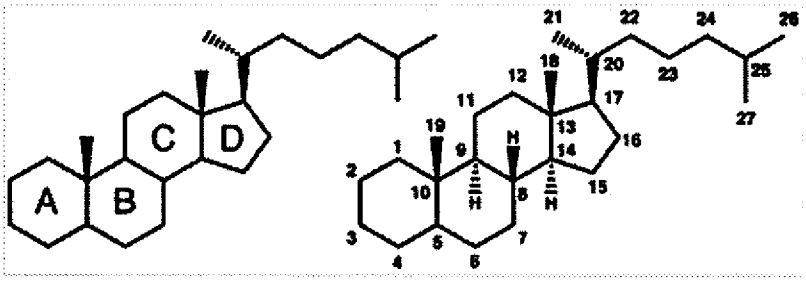
d. Phenol definition

a.Steroids

Steroid

From Wikipedia, the free encyclopedia
(Redirected from Steroids)

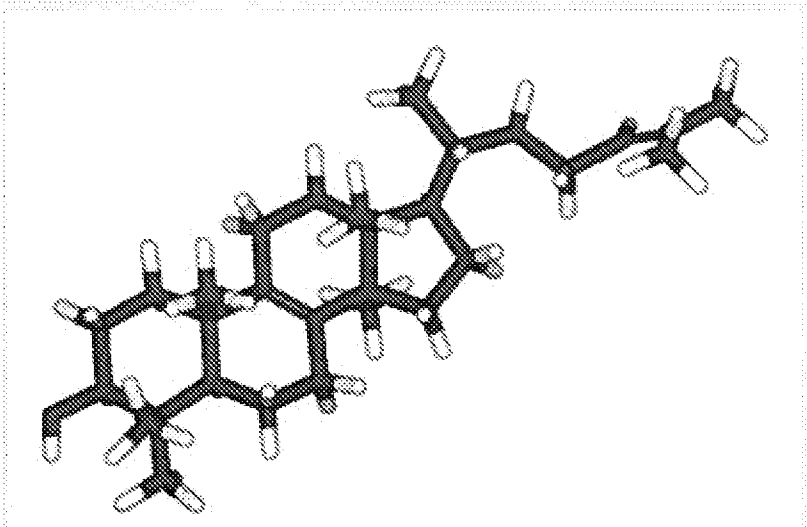
A **steroid** is a type of organic compound that contains a specific arrangement of four rings that are joined to each other. Examples of steroids include cholesterol, the sex hormones estradiol and testosterone, and the anti-inflammatory drug dexamethasone.



IUPAC recommended ring lettering (left) and atom numbering (right) of the steroid skeleton.[1][2]

The four rings A-D form a sterane core.

The sterane core of steroids is composed of seventeen carbon atoms bonded together to form four fused rings: three cyclohexane rings (designated as rings A, B, and C in the figure to the right) and one cyclopentane ring (the D ring). The steroids vary by the functional groups attached to these rings and by the oxidation state of the rings. Sterols are special forms of steroids, with a hydroxyl group at position-3 and a skeleton derived from cholestane.[2]



Stick model of the steroid lanosterol. The total number of carbons (30) reflects its triterpenoid origin.

Hundreds of distinct steroids are found in plants, animals, and fungi. All steroids are made in cells either from the sterols lanosterol (animals and fungi) or from cycloartenol (plants). Both lanosterol and cycloartenol are derived from the cyclization of the triterpene squalene.[3]

Contents

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- 2 Metabolism

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 - 2.1.1.1 Regulation and feedback
 - 2.1.1.2 Pharmacology
 - 2.1.1.3 Plants and bacteria
 - 2.1.2 DMAPP to lanosterol
- 2.2 Steroidogenesis
- 2.3 Elimination

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- 4 References
- 5 Further reading
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Classification

Taxonomical/Functional

Some of the common categories of steroids:

- Animal steroids
 - Insect steroids
 - Ecdysteroids such as ecdysterone
 - Vertebrate steroids
 - Steroid hormones
 - Sex steroids are a subset of sex hormones that produce sex differences or support reproduction. They include androgens, estrogens, and progestagens.
 - Corticosteroids include glucocorticoids and mineralocorticoids. Glucocorticoids regulate many aspects of metabolism and immune function, whereas mineralocorticoids help maintain blood volume and control renal excretion of electrolytes. Most medical 'steroid' drugs are corticosteroids.
 - Anabolic steroids are a class of steroids that interact with androgen receptors to increase muscle and bone synthesis. There are natural and synthetic anabolic steroids. In popular language, the word "steroids" usually refers to anabolic steroids.
 - Cholesterol, which modulates the fluidity of cell membranes and is the principal constituent of the plaques implicated in atherosclerosis.
- Plant steroids
 - Phytosterols
 - Brassinosteroids
- Fungus steroids
 - Ergosterols

Structural

It is also possible to classify steroids based upon their chemical composition. One example of how MeSH performs this classification is available at the Wikipedia MeSH catalog. Examples from this classification include:

Class	Examples	Number of carbon atoms
Cholestanes	cholesterol	27
Cholanes	cholic acid	24
Pregnanes	progesterone	21
Androstanes	testosterone	19
Estranes	estradiol	18

Gonane (or steroid nucleus) is the hypothetic parent (17-carbon tetracyclic) hydrocarbon molecule without any alkyl sidechains.[4]

Metabolism

Steroids include estrogen, cortisol, progesterone, and testosterone. Estrogen and progesterone are made primarily in the ovary and in the placenta during pregnancy, and testosterone in the testes. Testosterone is also converted into estrogen to regulate the supply of each, in the bodies of both females and males. Certain neurons and glia in the central nervous system (CNS) express the enzymes that are required for the local synthesis of pregnane neurosteroids, either *de novo* or from peripherally-derived sources. The rate-limiting step of steroid synthesis is the conversion of cholesterol to pregnenolone, which occurs inside the mitochondrion.[5]

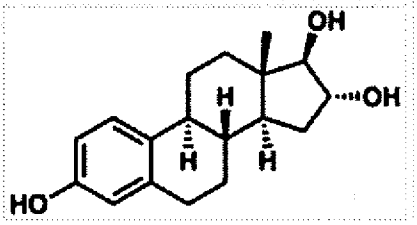
Estrogen

From Wikipedia, the free encyclopedia

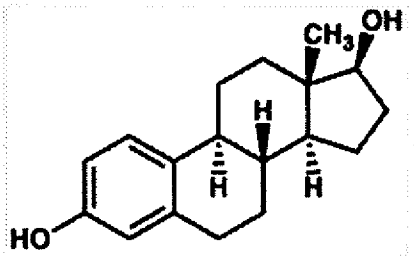
Estrogens (U.S., otherwise **oestrogens** or **œstrogens**) are a group of steroid compounds, named for their importance in the estrous cycle, and functioning as the primary female sex hormone, their name comes from estrus/oistros (period of fertility for female mammals) + gen/gonos = to generate.

Estrogens are used as part of some oral contraceptives, in estrogen replacement therapy for postmenopausal women, and in hormone replacement therapy for trans women.

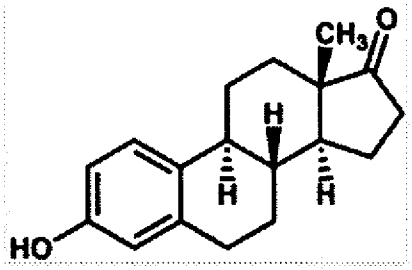
Like all steroid hormones, estrogens readily diffuse across the cell membrane. Once inside the cell, they bind to and activate estrogen receptors which in turn up-regulate the expression of many genes.[1] Additionally, estrogens have been shown to activate a G protein-coupled receptor, GPR30.[2]



Estriol. Note two hydroxyl (-OH) groups attached to the D ring (rightmost ring).



Estradiol. Note one hydroxyl group attached to the D ring. The 'di' refers both to this hydroxyl and the one on the A ring (leftmost).



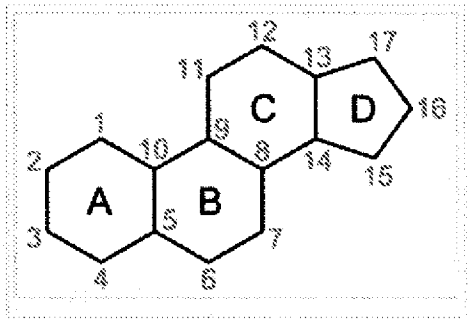
Estrone. Note the ketone (=O) group attached to the D ring.

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- 1 Types
 - 1.1 Steroidal
 - 1.2 Nonsteroidal
- 2 Biosynthesis
- 3 Function
 - 3.1 Fetal development
 - 3.2 Mental health
- 4 Medical applications
 - 4.1 Oral contraceptives
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 - 4.5 Miscellaneous
 - 4.6 Health risks and warning labels
- 5 Cosmetics
- 6 History
- 7 See also
- 8 References
- 9 External links and further reading

Sterane

From Wikipedia, the free encyclopedia



Steranes, formally named perhydrocyclopentanophenanthrene rings, are a class of 4-cyclic compounds derived from steroids or sterols via diagenetic and catagenetic degradation and saturation. They are sometimes used as biomarkers for the presence of eukaryotic cells. The sterane structure constitutes the core of all sterols and steroids.[1]

References

1. ^ About biomarkers (http://www-eaps.mit.edu/geobiology/biomarkers/steroids.html) geobiology@mit. Accessed 8 October 2009.

Retrieved from "http://en.wikipedia.org/wiki/Sterane"
Categories: Biochemistry methods | Biochemistry stubs

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 Wikipedia® is a registered trademark of the Wikimedia Foundation, Inc., a non-profit organization.

b. Flavonoids disclosed in Simpkins

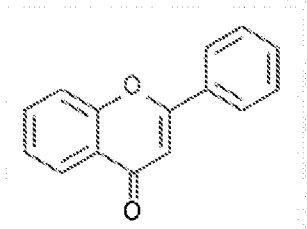
Flavonoid

From Wikipedia, the free encyclopedia

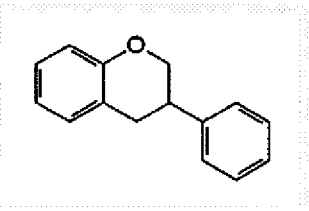
Flavonoids (or **bioflavonoids**), also collectively known as **Vitamin P** and **citrin**[1], are a class of plant secondary metabolites. According to the IUPAC nomenclature,[2] they can be classified into:

- *flavonoids*, derived from 2-phenylchromen-4-one (2-phenyl-1,4-benzopyrone) structure (examples: quercetin, rutin).
- *isoflavonoids*, derived from 3-phenylchromen-4-one (3-phenyl-1,4-benzopyrone) structure
- *neoflavonoids*, derived from 4-phenylcoumarine (4-phenyl-1,2-benzopyrone) structure.

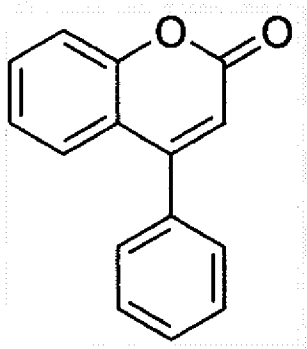
The three flavonoid classes above are all ketone-containing compounds, and as such, are flavonoids and flavonols. This class was the first to be termed "bioflavonoids." The terms flavonoid and **bioflavonoid** have also been more loosely used to describe non-ketone polyhydroxy polyphenol compounds which are more specifically termed flavanoids, flavan-3-ols, or catechins (although catechins are actually a subgroup of flavanoids).



Molecular structure of the flavone backbone (2-phenyl-1,4-benzopyrone)



Isoflavan structure



Neoflavonoids structure

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- 1 Biosynthesis
- 2 Biological roles
- 3 Potential for biological activity
 - 3.1 Antioxidant activity in vitro
 - 3.2 Other potential health benefits
 - 3.2.1 Cancer
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 - 3.2.3 Capillary stabilizing agents
- 4 Important flavonoids
 - 4.1 Quercetin
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- 5 Important dietary sources
 - 5.1 Citrus
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- 6 Subgroups
 - 6.1 Flavones
 - 6.2 Isoflavones
 - 6.3 Flavan-3-ols, Flavan-4-ols, Flavan-3,4-diols, and proanthocyanidins
 - 6.4 Anthocyanidins
- 7 Availability through microorganisms
- 8 See also
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Biosynthesis

Main article: Flavonoid biosynthesis

Biological roles

Flavonoids are widely distributed in plants fulfilling many functions.

Flavonoids are the most important plant pigments for flower coloration producing yellow or red/blue pigmentation in petals designed to attract pollinator animals.

Flavonoids secreted by the root of their host plant help *Rhizobia* in the infection stage of their symbiotic relationship with legumes like peas, beans, clover, and soy. Rhizobia living in soil are able to sense the flavonoids and this triggers the secretion of Nod factors, which in turn are recognized by the host plant and can lead to root hair deformation and several cellular responses such as ion fluxes and the formation of a root nodule.

They also protect plants from attacks by microbes, fungi[3] and insects.

Potential for biological activity

Flavonoids (specifically flavanoids such as the catechins) are "the most common group of polyphenolic compounds in the human diet and are found ubiquitously in plants".[4] Flavonols, the original bioflavonoids such as quercetin, are also found ubiquitously, but in lesser quantities. Both sets of compounds have evidence of health-modulating effects in animals which eat them.

The widespread distribution of flavonoids, their variety and their relatively low toxicity compared to other active plant compounds (for instance alkaloids) mean that many animals, including humans, ingest significant quantities in their diet. Resulting from experimental evidence that they may modify allergens, viruses, and carcinogens, flavonoids have potential to be biological "response modifiers", such as anti-allergic, anti-inflammatory,[5] anti-microbial[6] and anti-cancer activities shown from in vitro studies.[7]

Antioxidant activity in vitro

Flavonoids (both flavonols and flavanols) are most commonly known for their antioxidant activity in vitro.

Consumers and food manufacturers have become interested in flavonoids for their possible medicinal properties, especially their putative role in prevention of cancers and cardiovascular diseases. Although physiological evidence is not yet established, the beneficial effects of fruits, vegetables, tea, and red wine have sometimes been attributed to flavonoid compounds rather than to known micronutrients, such as vitamins and dietary minerals.[8]

Alternatively, research conducted at the Linus Pauling Institute and evaluated by the European Food Safety Authority indicates that, following dietary intake, flavonoids themselves are of little or no direct antioxidant value.[9][10] As body conditions are unlike controlled test tube conditions, flavonoids and other polyphenols are poorly absorbed (less than 5%), with most of what is absorbed being quickly metabolized and excreted. The increase in antioxidant capacity of blood seen after the consumption of flavonoid-rich foods is not caused directly by flavonoids themselves, but most likely is due to increased uric acid levels that result from metabolism of flavonoids.[11] According to Frei, "we can now follow the activity of flavonoids in the body, and one thing that is clear is that the body sees them as foreign compounds and is trying to get rid of them."

Other potential health benefits

Cancer

Physiological processing of unwanted flavonoid compounds induces so-called Phase II enzymes that also help to eliminate mutagens and carcinogens, and therefore may be of value in cancer prevention. Flavonoids could also induce mechanisms that may kill cancer cells and inhibit tumor invasion.[11] UCLA cancer researchers have found that study participants who

ate foods containing certain flavonoids, such as catechins found in strawberries and green and black teas; kaempferol from brussel sprouts and apples; and quercetin from beans, onions and apples, may have reduced risk of obtaining lung cancer.[12]

Research also indicated that only small amounts of flavonoids may be needed for possible benefits. Taking large dietary supplements likely provides no extra benefit and may pose risks. However, certainty of neither a benefit nor a risk has been proven yet in large-scale human intervention trials.[11]

Diarrhea

A study done at Children's Hospital & Research Center Oakland, in collaboration with scientists at Heinrich Heine University in Germany, has shown that epicatechin, quercetin and luteolin can inhibit the development of fluids that result in diarrhea by targeting the intestinal cystic fibrosis transmembrane conductance regulator Cl– transport inhibiting cAMP-stimulated Cl– secretion in the intestine.[13]

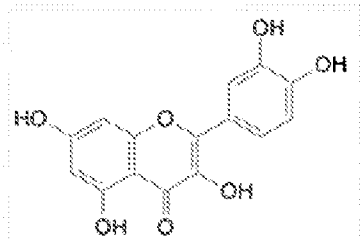
Capillary stabilizing agents

Bioflavonoids like rutin, monoxerutin, diosmin, troxerutin and hidrosmin have potential vasoprotective proprieties still under experimental evaluation.[*citation needed*]

Important flavonoids

Quercetin

Main article: quercetin

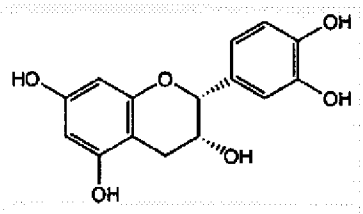


Quercetin

Quercetin, a flavonoid and more specifically a flavonol, is the aglycone form of other flavonoid glycosides, such as rutin and quercitrin, found in citrus fruit, buckwheat and onions. Quercetin forms the glycosides, quercitrin and rutin, together with rhamnose and rutinose, respectively.

Although there is preliminary clinical evidence that asthma, lung cancer and breast cancer are lower among people consuming higher dietary levels of quercetin,[14] the consensus of scientists, regulatory authorities such as the FDA, and patient support organizations like the American Cancer Society is that no physiological role exists, stating that dietary quercetin "is unlikely to cause any major problems or benefits."[15]

Epicatechin



Epicatechin (EC)

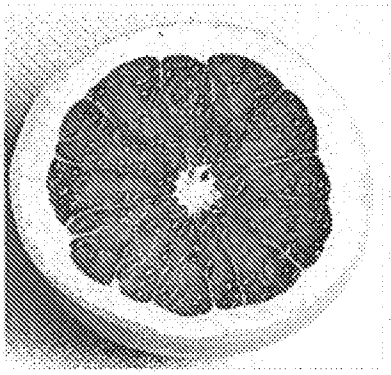
Epicatechin may improve blood flow and has potential for cardiac health. Cocoa, the major ingredient of dark chocolate, contains relatively high amounts of epicatechin and has been found to have nearly twice the antioxidant content of red wine and up to three times that of green tea in vitro.[16][17] In the test outlined above, it appears the potential antioxidant effects in vivo are minimal as the antioxidants are rapidly excreted from the body.

Important dietary sources

Good sources of flavonoids include all citrus fruits, berries, ginkgo biloba, onions[18][19], parsley[20], (particularly red onion[21]) pulses[22], tea (especially white and green tea), red wine, seabuckthorn, and dark chocolate (with a cocoa content of seventy percent or greater).

Citrus

The citrus bioflavonoids include hesperidin (a glycoside of the flavanone hesperetin), quercitrin, rutin (two glycosides of the flavonol quercetin), and the flavone tangeritin. In addition to possessing in vitro antioxidant activity and an ability to increase intracellular levels of vitamin C, rutin and hesperidin may have beneficial effects on capillary permeability and blood flow. They also exhibit anti-allergy and anti-inflammatory benefits of quercetin from in vitro studies. Quercetin can also inhibit reverse transcriptase, part of the replication process of retroviruses.[23] The therapeutic relevance of this inhibition has not been established.
Hydroxyethylrutosides (HER) have potential for use in the treatment of abnormal capillary permeability, bruising, hemorrhoids, and varicose veins.



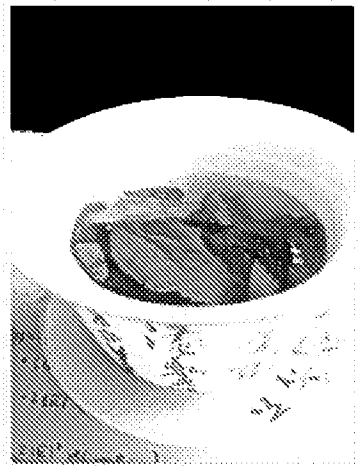
A variety of flavonoids are found in citrus fruits, including grapefruit.

Tea

Main article: Health effects of tea

Green tea flavonoids are potent antioxidant compounds in vitro, with potential to reduce incidence of cancer [24][25] and heart disease. The major flavonoids in green tea are kaempferol and catechins (catechin, epicatechin, epicatechin gallate (ECG), and epigallocatechin gallate (EGCG)).

In producing teas such as oolong tea and black tea, the leaves are allowed to oxidize, during which enzymes present in the tea convert some or all of the catechins to larger molecules.[*citation needed*] However, green tea is produced by steaming the fresh-cut tea leaves, which deactivates these enzymes, and oxidation does not significantly occur. White tea is the least processed of teas and is shown to present the highest amount of catechins known to occur in *Camellia sinensis*.[*citation needed*]



Green tea contains flavonoids

Wine

See also: Phenolic compounds in wine

Grape skins contain significant amounts of flavonoids as well as other polyphenols[26].
Both red and white wine contain flavonoids; however, since red wine is produced by fermentation in the presence of the grape skins, red wine has been observed to contain higher levels of flavonoids, and other polyphenolics such as resveratrol.

Dark chocolate

Main article: Health effects of chocolate

Flavonoids exist naturally in cacao, but because they can be bitter, they are often removed from chocolate, even dark chocolate.[27] Although flavonoids are present in milk chocolate, milk may interfere with their absorption.[28]

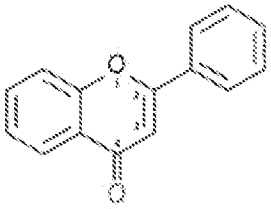
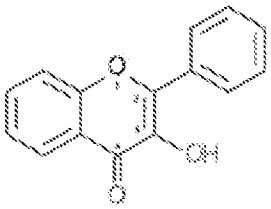
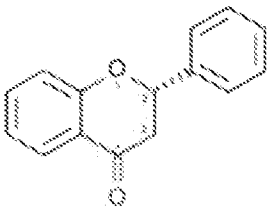
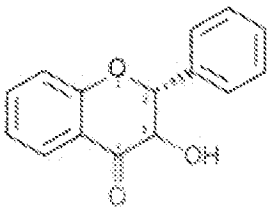
Subgroups

Over 5000 naturally occurring flavonoids have been characterized from various plants. They have been classified according to their chemical structure, and are usually subdivided into the following subgroups (for further reading see [29]):

Flavones

Flavones are divided into four groups:[30]

Group	Skeleton	Examples

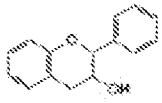
	Description	Functional groups		Structural formula	
		3-hydroxyl	2,3-dihydro		
Flavone	**2-phenylchromen-4-one**	✗	✗		Luteolin, Apigenin, Tangeritin
Flavonol or 3-hydroxy**flavone**	3-hydroxy-**2-phenylchromen-4-one**	✓	✗		Quercetin, Kaempferol, Myricetin, Fisetin, Isorhamnetin, Pachypodol, Rhamnazin
Flavanone	2,3-dihydro-**2-phenylchromen-4-one**	✗	✓		Hesperetin, Naringenin, Eriodictyol, Homoeriodictyol
Flavanonol or 3-Hydroxy**flavanone** or 2,3-dihydro**flavonol**	3-hydroxy-2,3-dihydro-**2-phenylchromen-4-one**	✓	✓		Taxifolin (or Dihydroquercetin), Dihydrokaempferol

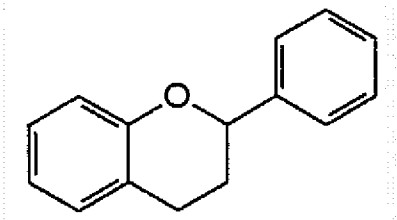
Isoflavones

- Isoflavones
 Isoflav*ones* use the 3-phenylchromen-*4-one* skeleton (with no hydroxyl group substitution on carbon at position 2).
 Examples: Genistein, Daidzein, Glycitein

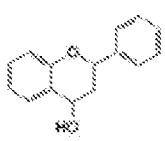
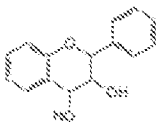
Flavan-3-ols, Flavan-4-ols, Flavan-3,4-diols, and proanthocyanidins

Derivatives of flavan.

Skeleton	Name
	Flavan-3-ol



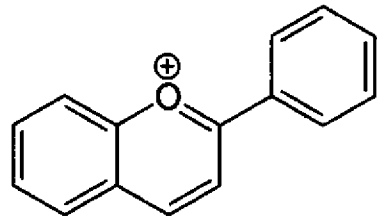
Flavan structure

	Flavan-4-ol
	Flavan-3,4-diol (leucoanthocyanidin)

- **Flavan-3-ols (also known as flavanols) and Proanthocyanidins**
 Flavan-*3-ols* use the 2-phenyl-3,4-dihydro-2*H*-chromen-*3-ol* skeleton.
 Catechins (Catechin (C), Gallocatechin (GC), Catechin 3-gallate (Cg), Gallocatechin 3-gallate (GCg)), Epicatechins (Epicatechin (EC), Epigallocatechin (EGC), Epicatechin 3-gallate (ECg), Epigallocatechin 3-gallate (EGCg))
 Proanthocyanidins are dimers, trimers, oligomers, or polymers of the flavanols.

Anthocyanidins

- **Anthocyanidins**
 Anthocyanidins are the aglycones of anthocyanins. Anthocyanidins use the **flavylium** (2-phenylchromenylium) ion skeleton
 Examples: Cyanidin, Delphinidin, Malvidin, Pelargonidin, Peonidin, Petunidin


Flavylium skeleton of anthocyanidins

Availability through microorganisms

Several recent research articles have demonstrated the efficient production of flavonoid molecules from genetically-engineered microorganisms[31][32][33].

See also

- Naturopathic medicine
- Phytoalexin
- Phytochemistry
- Phytonutrients

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6. ^ Cushnie TPT, Lamb AJ (2005). "Antimicrobial activity of flavonoids". *International Journal of Antimicrobial Agents* **26** (5): 343–356. doi:10.1016/j.ijantimicag.2005.09.002 (http://dx.doi.org/10.1016%2Fj.ijantimicag.2005.09.002) . PMID 16323269 (http://www.ncbi.nlm.nih.gov/pubmed/16323269) .
7. ^ de Sousa RR, Queiroz KC, Souza AC, Gurgueira SA, Augusto AC, Miranda MA, Peppelenbosch MP, Ferreira

Catechin

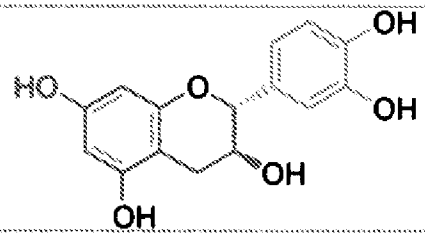
From Wikipedia, the free encyclopedia

Catechin (Pronunciation: /ˈka-tə-ˌkin/) is a polyphenolic antioxidant plant secondary metabolite. The term *catechins* is also commonly used to refer to the related family of flavonoids and the subgroup flavan-3-ols (or simply flavanols).

The name of the catechin chemical family derives from catechu which is the juice or boiled extract of *Mimosa catechu* (*Acacia catechu* L.f))[1]

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- 4 Bioactivity studies
 - 4.1 Interactions with human genes
- 5 Health benefits
 - 5.1 Protects the Mouse Brain After a Stroke
 - 5.2 Histidine decarboxylase inhibitor
 - 5.3 Monoamine oxidase inhibitor
- 6 Ecological effects
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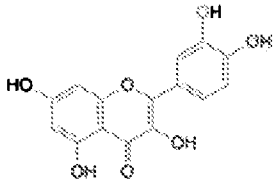
Catechin	
	
IUPAC name	
(2*R*,3*S*)-2-(3,4-dihydroxyphenyl)-3,4-dihydro-2*H*-chromene-3,5,7-triol	
Other names	
Catechol Cianidanol Cyanidanol (+)-catechin D-Catechin Catechinic acid Catechuic acid Cianidol Dexcyanidanol (2R,3S)-Catechin 2,3-trans-catechin 3,3',4',5,7–flavanpentol	
Identifiers	
CAS number	7295-85-4, (±) 154-23-4 (+) 18829-70-4 (-)
PubChem	9064
ChemSpider	8711
SMILES	Oc1ccc(cc1O)[C@H]3Oc2cc(O)cc(O)c2C[C@@H]3O
InChI	1/C15H14O6 /c16-8-4-11(18)9-6-13(20)15(21-14(9)5-8)7-1-2-10(17)12(19)3-7 /h1-5,13,15-20H,6H2/t13-,15+/m0/s1
InChI key	PFTAWBLQPZVEMU-DZGCQCFKBX
Properties	
Molecular formula	$C_{15}H_{14}O_6$
Molar mass	290.26 g/mol
Exact mass	290.079038
Appearance	Colorless solid
Melting point	175–177 °C
λ_{max}	276 nm

Quercetin

From Wikipedia, the free encyclopedia

Quercetin /'kwɜrsɪtɪn/ is a flavonol, plant-derived flavonoid, used as a nutritional supplement. Laboratory studies show it may have anti-inflammatory and antioxidant properties,[1][2] and it is being investigated for a wide range of potential health benefits.[2][3]

Quercetin has been shown to increase energy expenditure in rats, but only for short periods (fewer than 8 weeks).[1] Effects of quercetin on exercise tolerance in mice have been associated with increased mitochondrial biogenesis.[2]

Quercetin	
	
IUPAC name	
2-(3,4- dihydroxyphenyl)- 3,5,7- trihydroxy- 4*H*- chromen- 4-one	
Other names	
Sophoretin Meletin Quercetine Xanthaurine Quercetol Quercitin Quertine Flavin meletin	
Identifiers	
CAS number	117-39-5 ✓
PubChem	5280343
SMILES	[illegible]
Properties	
Molecular formula	$C_{15}H_{10}O_7$
Molar mass	302.236 g/mol
Exact mass	302.042653
Density	1.799 g/cm^3
Melting point	316 °C
✓ (what is this?) (verify) (http://en.wikipedia.org/w/index.php?title=Quercetin&diff=cur&oldid=307759997) Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)	
Infobox references	

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- 1 Informed medical opinion
- 2 Occurrence
- 3 Biosynthesis
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- 5 Drug interactions
- 6 Glycosides
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Informed medical opinion

The American Cancer Society says that while quercetin "has been promoted as being effective against a wide variety of diseases, including cancer," and "some early lab results appear promising, as of yet there is no reliable clinical evidence that quercetin can prevent or treat cancer in humans." In the amounts consumed in a healthy diet, quercetin "is unlikely to cause any major problems or benefits."[4]

Adequate dietary intake of fruits and vegetables may *reduce the risk* of cancer.[5] Research shows that quercetin influences cellular mechanisms in vitro and, in animal studies, there is evidence from human population studies that quercetin may, in a very limited fashion, reduce the risk of certain cancers.[6][7]

In laboratory studies of cells (in vitro), quercetin produces changes that are also produced by compounds that cause cancer (carcinogens), but these studies don't report increased cancer in animals or humans.[8][9][10] The U.S. Food and Drug Administration has not approved any health claims for quercetin.[11] There is current early-stage clinical research on quercetin addressing safety and efficacy against sarcoidosis, asthma and glucose absorption in obesity and diabetes (February 2009).[12]

Quercetin is the aglycone form of a number of other flavonoid glycosides, such as rutin and quercitrin, found in citrus fruit, buckwheat and onions. Quercetin forms the glycosides quercitrin and rutin together with rhamnose and rutinose, respectively. Quercetin is classified as IARC group 3 (no evidence of carcinogenicity in humans).

Occurrence

Quercetin is a naturally-occurring polar auxin transport inhibitor.[*citation needed*]

Foods rich in quercetin include black & green tea (*Camellia sinensis*; 2000-2500mg/kg), capers (1800 mg/kg),[13] lovage (1700 mg/kg), apples (44 mg/kg), onion, especially red onion (1910 mg/kg)[14](higher concentrations of quercetin occur in the outermost rings[15]), red grapes, citrus fruit, tomato, broccoli and other leafy green vegetables, and a number of berries including cherry, raspberry, bog whortleberry (158 mg/kg, fresh weight), lingonberry (cultivated 74 mg/kg, wild 146 mg/kg), cranberry (cultivated 83 mg/kg, wild 121 mg/kg), chokeberry (89 mg/kg), sweet rowan (85 mg/kg), rowanberry (63 mg/kg), sea buckthorn berry (62 mg/kg), crowberry (cultivated 53 mg/kg, wild 56 mg/kg),[16] and the fruit of the prickly pear cactus. A recent study found that organically grown tomatoes had 79% more quercetin than "conventionally grown".[17]

A study[18] by the University of Queensland, Australia, has also indicated the presence of quercetin in varieties of honey, including honey derived from eucalyptus and tea tree flowers.[19]

Biosynthesis

Hesperetin

From Wikipedia, the free encyclopedia

Hesperetin is a bioflavonoid and, to be more specific, a flavanone. Hesperidin (a flavonone glycoside) is water-soluble due to the presence of the sugar part in its structure, so on ingestion it releases its aglycone, i.e, hesperetin.
Hesperidin is found in Citrus fruits.

Glycosides

Neohesperidin is the 7-neohesperidoside of hesperetin.

Hesperetin 7-rhamnoside can be isolated from *Cordia obliqua*[1].

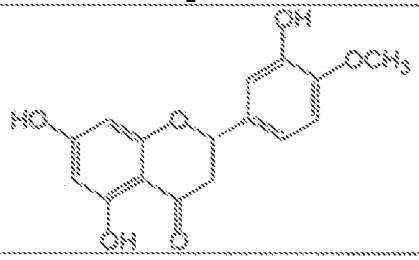
References

1. ^ Hesperetin 7-rhamnoside from Cordia obliqua. J.S. Chauhan, S.K. Srivastava and M. Sultan, Phytochemistry, Volume 17, Issue 2, 1978, Page 334 (http://www.sciencedirect.com /science?_ob=ArticleURL& _udi=B6TH7-42H2V45-F0&_user=10& _coverDate=12%2F31%2F1978&_rdoc=1& _fmt=high&_orig=search&_sort=d& _docanchor=&view=c&_acct=C000050221& _version=1&_urlVersion=0&_userid=10& md5=34fc3c4e4499d15d5eaa94ebe840ca93)

Retrieved from "http://en.wikipedia.org /wiki/Hesperetin"
Categories: Flavanones | Ketone stubs

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Hesperetin



IUPAC name	
(S)-2,3-dihydro-5,7-dihydroxy-2-(3-hydroxy-4-methoxyphenyl)-4H-1-benzopyran-4-one	
Identifiers	
CAS number	520-33-2 ✓
PubChem	72281
EC number	208-290-2
SMILES	OC1=C(C(C[C@@H](C[C@]3=CC=C(OC)C(O)=C3)O2)=O)C2=CC(O)=C1
Properties	
Molecular formula	$C_{16}H_{14}O_6$
Molar mass	302.27 g/mol
Exact mass	302.079038
Melting point	226-228 °C
Solubility in other solvents	Sol. EtOH, alkalis

✓ (what is this?) (verify) (http://en.wikipedia.org /w/index.php?title=Hesperetin&diff=cur& oldid=309777589)
Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)

Infobox references

Biochanin A

From Wikipedia, the free encyclopedia

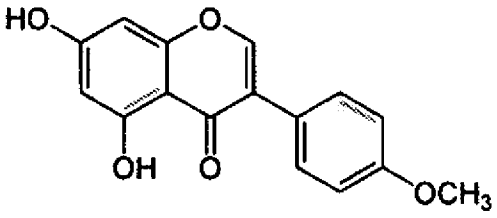
Biochanin A is an O-methylated isoflavone. It is a natural organic compound in the class of phytochemicals known as flavonoids. Biochanin A can be found in red clover [1] in soy, in alfalfa sprouts, in peanuts, in chickpea (*Cicer arietinum*) and in other legumes.

Biochanin A is classified as a phytoestrogen and a cancer treatment.

Metabolism

The enzyme biochanin-A reductase uses dihydrobiochanin A and NADP+ to produce biochanin A, NADPH, and H+.

The enzyme isoflavone-7-O-beta-glucoside 6"-O-malonyltransferase uses malonyl-CoA and biochanin A 7-O-beta-D-glucoside to produce CoA and biochanin A 7-O-(6-O-malonyl-beta-D-glucoside).

Biochanin A	
	
IUPAC name	
5,7-dihydroxy-3-(4-methoxyphenyl)chromen-4-one	
Other names	
Biochanin 4'-Methylgenistein olmelin Biochanine A Biochanin-A Genistein 4-methyl ether 5,7-Dihydroxy-4'-methoxyisoflavone	
Identifiers	
CAS number	491-80-5
PubChem	5280373
SMILES	COC1=CC=C(C=C1)C2=COC3=CC(=CC(=C3C2=O)O)O
Properties	
Molecular formula	$C_{16}H_{12}O_5$
Molar mass	284.26 g/mol
Exact mass	284.068473
✓ (what is this?) (verify) (http://en.wikipedia.org/w/index.php?title=Biochanin_A&diff=cur&oldid=310163646) Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)	
Infobox references	

References

1. ^ Red clover isoflavones biochanin A and formononetin are potent ligands of the human aryl hydrocarbon receptor, The Journal of Steroid Biochemistry and Molecular Biology, Volume 108, Issues 1-2, January 2008, S. Medjakovic, A. Jungbauer. (http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B6T8X-4PYHNTS-1&_user=10&_coverDate=01%2F31%2F2008&_alid=990010295&_rdoc=5&_fmt=high&_orig=search&_cdi=5098&_docanchor=&view=c&_ct=928&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=47693876017628ac7b80c84af150d5e5)

See also

- List of phytochemicals in food

Retrieved from "http://en.wikipedia.org/wiki/Biochanin_A"

Kaempferol

From Wikipedia, the free encyclopedia

Kaempferol is a natural flavonoid that has been isolated from tea,[1] broccoli, *Delphinium*, Witch-hazel, grapefruit, brussel sprouts, apples and other plant sources. Kaempferol is a yellow crystalline solid with a melting point of 276-278 °C. It is slightly soluble in water but soluble in hot ethanol and diethyl ether.

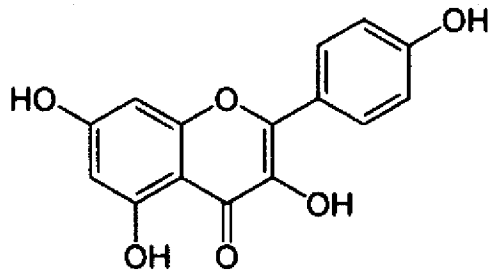
Many glycosides of kaempferol, such as kaempferitrin and astragalin, have been isolated as natural products from plants. Kaempferol consumption in tea and broccoli has been associated with reduced risk of heart disease.[*citation needed*]

Kaempferol is what gives the flowers of *Acacia decurrens* and *Acacia longifolia* their color.[2] The compound has antidepressant properties.[3]

An 8-year study found that three flavonols (kaempferol, quercetin, and myricetin) reduced the risk of pancreatic cancer by 23 percent.[4]

UCLA cancer researchers have found that study participants who ate foods containing certain flavonoids seemed to be protected from developing lung cancer. Dr. Zuo-Feng Zhang, of the UCLA's Jonsson Cancer Center and a professor of public health and epidemiology at the UCLA School of Public Health said the flavonoids that appeared to be the most protective included catechin, found in strawberries and green and black teas; kaempferol, found in brussel sprouts and apples; and quercetin, found in beans, onions and apples.[5]

Kaempferol



IUPAC name	
3,5,7-trihydroxy-2-(4-hydroxyphenyl)-4H-1-benzopyran-4-one	
Other names	
Kaempherol; Robigenin; Pelargidenolon; Rhamnolutein; Rhamnolutin; Populnetin; Trifolitin; Kempferol; Swartziol	
Identifiers	
CAS number	520-18-3 ✓
PubChem	5280863
Properties	
Molecular formula	$C_{15}H_{10}O_6$
Molar mass	286.23 g/mol
Exact mass	286.047738
Melting point	276-278 °C

✓ (what is this?) (verify) (http://en.wikipedia.org/w/index.php?title=Kaempferol&diff=cur&oldid=309593758)
Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)

Infobox references

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 - 1.1 Glycosides
- 2 List of the plants that contains the chemical
- 3 Toxicology
- 4 References

c. Phenols disclosed in Simpkins

Probucol

From Wikipedia, the free encyclopedia

Probucol is an anti-hyperlipidemic drug[1] initially developed in the treatment of coronary artery disease.

However, clinical trials were stopped after it was found that may lower HDL in patients with a previous history of heart disease.

Probucol was initially developed in the 1970s by a chemical company to maximize airplane tire longevity.

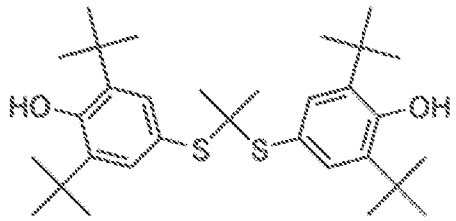
Mechanism

Probucol lowers the level of cholesterol in the bloodstream by increasing the rate of LDL catabolism. Additionally, probucol may inhibit cholesterol synthesis and delay cholesterol absorption [2]. Probucol is a powerful antioxidant which inhibits the oxidation of cholesterol in LDLs; this slows the formation of foam cells, which contribute to atherosclerotic plaques.

It is believed to act at ABCA1.[3]

It also lowers levels of HDL.[4]

Probucol



Systematic (IUPAC) name

4,4'-[propane-2,2-diylbis(thio)]bis(2,6-di-*tert*-butylphenol)

Identifiers

CAS number	23288-49-5
ATC code	C10AX02
PubChem	CID 4912

Chemical data

Formula	$C_{31}H_{48}O_2S_2$
Mol. mass	516.844 g/mol
Synonyms	2,6-di-*tert*-butyl-4-({2-[(3,5-di-*tert*-butyl-4-hydroxyphenyl)sulfanyl]propan-2-yl}sulfanyl)phenol

Therapeutic considerations

Pregnancy cat.	?
Legal status	

✓**(what is this?) (verify) (http://en.wikipedia.org/w/index.php?&diff=cur&oldid=312046035)**

References

1. ^ Yamamoto A (December 2008). "A Uniqe Antilipidemic Drug - Probucol" (http://joi.jlc.jst.go.jp/JST.JSTAGE/jat/E621?from=PubMed) (). *J. Atheroscler. Thromb.* **15** (6): 304–5. PMID 19075491 (http://www.ncbi.nlm.nih.gov/pubmed/19075491) . http://joi.jlc.jst.go.jp/JST.JSTAGE/jat/E621?from=PubMed.
2. ^ "Probucol. Drugs.com web site. [1] (http://www.drugs.com/MMX/Probucol.html)
3. ^ Favari E, Zanotti I, Zimetti F, Ronda N, Bernini F, Rothblat GH (December 2004). "Probucol inhibits ABCA1-mediated cellular lipid efflux" (http://atvb.ahajournals.org/cgi/pmidlookup?view=long&pmid=15514211) . *Arterioscler. Thromb. Vasc. Biol.* **24** (12): 2345–50. doi:10.1161/01.ATV.0000148706.15947.8a (http://dx.doi.org/10.1161%2F01.ATV.0000148706.15947.8a) . PMID 15514211 (http://www.ncbi.nlm.nih.gov/pubmed/15514211) . http://atvb.ahajournals.org/cgi/pmidlookup?view=long&pmid=15514211.
4. ^ PMID 18279878

Salicylic acid

From Wikipedia, the free encyclopedia
(Redirected from Salicylates)

Salicylic acid (from Latin *salix*, *willow tree*, from the bark of which the substance is obtained) is a beta hydroxy acid. This colorless crystalline organic acid is widely used in organic synthesis and functions as a plant hormone. It is derived from the metabolism of salicin. In addition to being a compound that is chemically similar to but not identical to the active component of aspirin (*acetylsalicylic acid*), it is probably best known for its use in anti-acne treatments. The salts and esters of salicylic acid are known as **salicylates**.

Contents

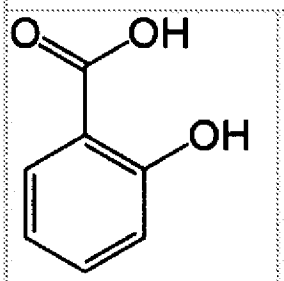
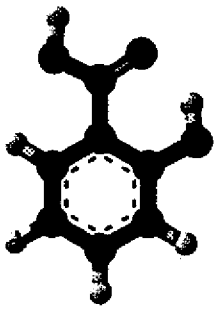
- 1 Chemistry
- 2 Plant hormone
- 3 Production
- 4 History
- 5 Medicinal and cosmetic uses
- 6 Other uses
- 7 Safety
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- 10 External links

Chemistry

Salicylic acid has the formula $C_6H_4(OH)COOH$, where the OH group is ortho to the carboxyl group. It is also known as 2-hydroxybenzenecarboxcylic acid. It is poorly soluble in water (0.2 g/100 ml H_2O at 20 °C).[3] Aspirin (acetylsalicylic acid or ASA) can be prepared by the esterification of the phenolic hydroxyl group of salicylic acid with the acetate ion from acetic acid.

Plant hormone

Salicylic acid (SA) is a phenolic phytohormone and is

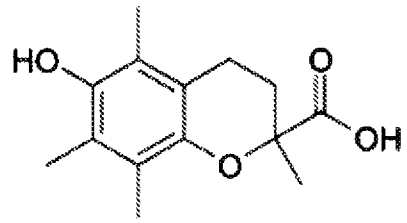
Salicylic acid	
	
IUPAC name	
2-Hydroxybenzoic acid	
Identifiers	
CAS number	69-72-7
PubChem	338
ChemSpider	331
EC number	200-712-3
SMILES	OC(=O)c1ccccc1O
Properties	
Molecular formula	$C_7H_6O_3$
Molar mass	138.12 g mol^{-1}
Density	1.443 g/cm^3
Melting point	159.0 °C, 432 K, 318 °F
Boiling point	211 °C (20 mmHg)
Solubility in water	0.2 g/100 mL H_2O (20 °C)
Solubility in chloroform, ethanol, methanol	Chloroform 0.19 M, ethanol 1.84 M, methanol 2.65 M [1]
Acidity (pK_a)	2.97 [2]
Related compounds	
Related compounds	Methyl salicylate, Benzoic acid, Phenol, Aspirin, 4-Hydroxybenzoic acid, Magnesium salicylate, Choline salicylate, Bismuth subsalicylate, Sulfosalicylic acid

Trolox

From Wikipedia, the free encyclopedia

Trolox is Hoffman-LaRoche's trade name for 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid, a water-soluble derivative of vitamin E. It is an antioxidant, like vitamin E, and is used in biological or biochemical applications to reduce oxidative stress or damage.

Trolox equivalent antioxidant activity (TEAC) is a measurement of antioxidant strength based on Trolox, measured in units called Trolox Equivalents (TE), e.g. micromolTE/100g. Due to the difficulties in measuring individual antioxidant components of a complex mixture (such as blueberries or tomatoes), Trolox equivalency is used as a benchmark for the antioxidant capacity of such a mixture. Trolox equivalency is most often measured using the ABTS decolorization assay.[1] Other measures include Oxygen radical absorbance capacity (ORAC) and Ferric Reducing Ability of Plasma (FRAP).

Trolox	
	
Identifiers	
CAS number	56305-04-5
PubChem	40634
SMILES	CC1=C(C(=C2CCC(OC2=C1C)(C)C(=O)O)C)O
Properties	
Molecular formula	$C_{14}H_{18}O_4$
Molar mass	250.29 g mol^{-1}
Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)	
Infobox references	

Notes

1. ^ Re, R.; Pellegrini, N.; Pannala, A.; Yang, M.; Rice-Evans, C. Antioxidant activity applying an improved ABTS radical cation decolorization assay. Free Radical Biol. Med. 1999, 26, 1231-1237

Retrieved from "http://en.wikipedia.org/wiki/Trolox"
Categories: Vitamins | Antioxidants

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Cinnamic acid

From Wikipedia, the free encyclopedia

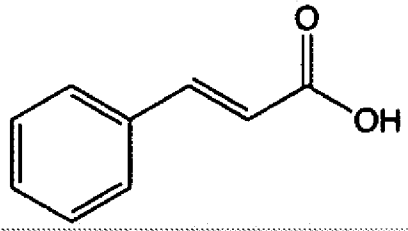
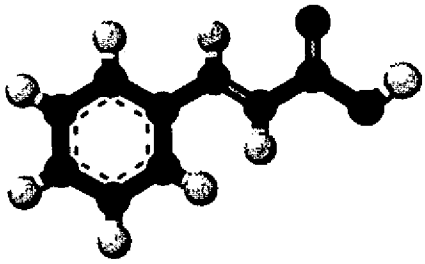
Cinnamic acid has the formula $C_6H_5CHCHCOOH$ and is a white crystalline acid, which is slightly soluble in water. It has a melting point of 133°C and a boiling point of 300°C.

It is obtained from oil of cinnamon, or from balsams such as storax. It is also found in shea butter and is the best indication of its environmental history and post-extraction conditions. It can also be made synthetically.

Cinnamic acid is used in flavours, synthetic indigo, and certain pharmaceuticals, though its primary use is in the manufacturing of the methyl, ethyl, and benzyl esters for the perfume industry. Cinnamic acid has a "honey, floral odor" (Merck Index); it and its more volatile ethyl ester (ethyl cinnamate) are flavour components in the essential oil of cinnamon, in which related cinnamaldehyde is the major constituent. Cinnamic acid is also part of the biosynthetic shikimate and phenylpropanoid pathways. Its biosynthesis is performed by action of the enzyme phenylalanine ammonia-lyase (PAL) on phenylalanine.

Cinnamic acid is soluble in diethyl ether, insoluble in hexane.

Cinnamic acid is also a kind of self-inhibitor produced by fungal spore to prevent germination.

Cinnamic acid	
	
	
IUPAC name	
(*E*)-3-phenylprop-2-enoic acid	
Other names	
Cinnamic Acid *trans*-Cinnamic Acid Phenylacrylic acid Cinnamylic acid 3-Phenylacrylic acid (E)-Cinnamic acid Benzenepropenoic acid Isocinnamic acid	
Identifiers	
CAS number	140-10-3
PubChem	444539
Properties	
Molecular formula	$C_9H_8O_2$
Molar mass	148.17 g/mol
Exact mass	148.05243
Appearance	monoclinic crystals
Density	1.2475 g/cm^3
Melting point	134 °C
Boiling point	300 °C
Solubility in water	0.4 g/L (20 °C)
Solubility in chloroform, ethanol, methanol	chloroform 0.93 M, ethanol 0.86 M, methanol 1.1 M [1]

References

1. ^ Solubility of cinnamic acid in non-aqueous solvents (http://oru.edu/cccda/sl/solubility/allsolvents.php?solute=cinnamic%20acid)

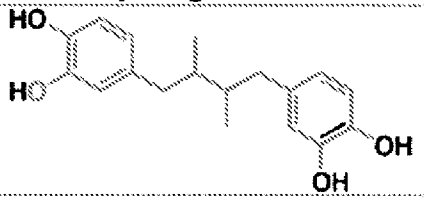
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Nordihydroguaiaretic acid

From Wikipedia, the free encyclopedia

Nordihydroguaiaretic acid (NDGA) is a potent antioxidant compound found in the long-lived creosote bush. It is believed that NDGA reduces cell damage by free radicals, so under the free-radical theory of aging, could be responsible for the bush's long life. A 1986 study [1] involved feeding female mosquitos NDGA to test the effect on their average life span. While the usual mosquito life span was 29 days, the NDGA-fed mosquitos lived an average of 45 days—an increase of 50 percent.
Nordihydroguaiaretic acid is also published as lengthening the lifespan of mice

The plant has been used to treat a variety of illnesses including infertility, rheumatism, arthritis, diabetes, gallbladder and kidney stones, pain and inflammation but its use is controversial. It was widely used during the 1950s as a food preservative and to preserve natural fibers but was later banned after reports of toxicity during the early 1960s. Recently, it has been used as a nutritional supplement, however renal and hepatotoxicity are reported for chronic use of creosote bush and NDGA. [2]

Nordihydroguaiaretic acid	
	
IUPAC name	
4,4'-(2,3-dimethylbutane-1,4-diyl)dibenzene-1,2-diol	
Identifiers	
CAS number	500-38-9
PubChem	4534
MeSH	Nordihydroguaiaretic+acid
SMILES	Oc2ccc(CC(C)C(C)Cc1ccc(O)c(O)c1)cc2O
Properties	
Molecular formula	$C_{18}H_{22}O_4$
Molar mass	302.36 g mol^{-1}
Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)	
Infobox references	

References

1. ^ Richie JP Jr, Mills BJ, Lang CA. "Dietary nordihydroguaiaretic acid increases the life span of the mosquito." *Proc Soc Exp Biol Med.* 1986 Oct;183(1):81-5
2. ^ Adapted from Arteaga S, Andrade-Cetto A, Cardenas R. "Larrea tridentata (Creosote bush), an abundant plant of Mexican and US-American deserts and its metabolite nordihydroguaiaretic acid." *J Ethnopharmacol.* 2005 Apr 26;98(3):231-9

Retrieved from "http://en.wikipedia.org/wiki/Nordihydroguaiaretic_acid"
Categories: Antioxidants | Benzenediols | Phenylpropanoids

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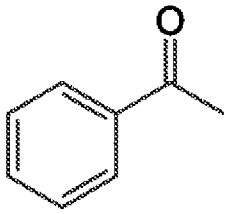
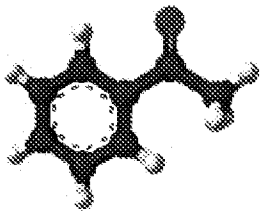
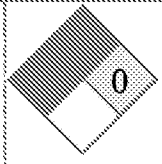
Acetophenone

From Wikipedia, the free encyclopedia

Acetophenone is the organic compound with the formula $C_6H_5C(O)CH_3$. It is the simplest aromatic ketone. This colourless, viscous liquid is a precursor to useful resins and fragrances.[1]

Contents

- 1 Production
- 2 Uses
 - 2.1 Precursor to resins
 - 2.2 Precursor to styrene
 - 2.3 Use in pharmaceutical and related areas
 - 2.4 Niche uses
- 3 Natural occurrence
- 4 Pharmacology
- 5 References

Acetophenone	
	
IUPAC name	
1-phenylethanone	
Other names	
Phenyl methyl ketone, ACP, Phenylethanone	
Identifiers	
CAS number	98-86-2
PubChem	7410
ChemSpider	7132
SMILES	O=C(c1ccccc1)C
InChI	1/C8H8O/c1-7(9)8-5-3-2-4-6-8/h2-6H,1H3
InChI key	KWOLFJPFCHCOCG-UHFFFAOYAT
Properties	
Molecular formula	C_8H_8O
Molar mass	120.15 g mol^{-1}
Density	1.028 g/cm³
Melting point	19-20 °C
Boiling point	202 °C
Solubility in water	5.5 g/L at 25°C 12.2 g/L at 80°C
Hazards	
MSDS	External MSDS
EU classification	 Xn
NFPA 704	

Production

Acetophenone can be obtained by a variety of methods. In industry, acetophenone is recovered as a by-product of the oxidation of ethylbenzene, which mainly gives ethylbenzene hydroperoxide for use in the production of propylene oxide.[1]

Uses

Precursor to resins

Commercially significant resins are produced from treatment of acetophenone with formaldehyde and base. The resulting polymers are conventionally described with the formula $[(C_6H_5C(O)CH]_x(CH_2)_x\}_n$, resulting from aldol condensation. These materials are components of coatings and inks. Modified acetophenone-formaldehyde resins are produced by the

Propyl gallate

From Wikipedia, the free encyclopedia

Propyl gallate, or propyl 3,4,5-trihydroxybenzoate is an ester formed by the condensation of gallic acid and propanol. Since 1948, this antioxidant has been added to foods containing oils and fats to prevent oxidation.[1] As a food additive, it is used under the E number **E310**.

Contents

- 1 Description
- 2 Uses
- 3 Biological effects
- 4 References

Description

Propyl gallate is an anti-oxidant. It protects against oxidation by hydrogen peroxide and oxygen free radicals.

Uses

Propyl gallate is used to protect oils and fats in products from oxidation.

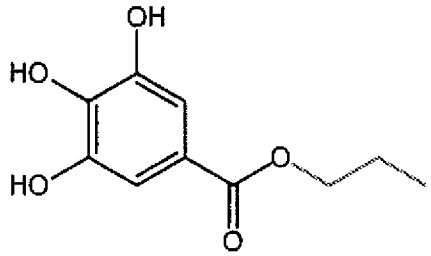
It is used in foods, cosmetics, hair products, adhesives, and lubricants.

It is used as a triplet quencher in fluorescence microscopy.

Biological effects

A recent study found that propyl gallate acts as an estrogen antagonist.[2]

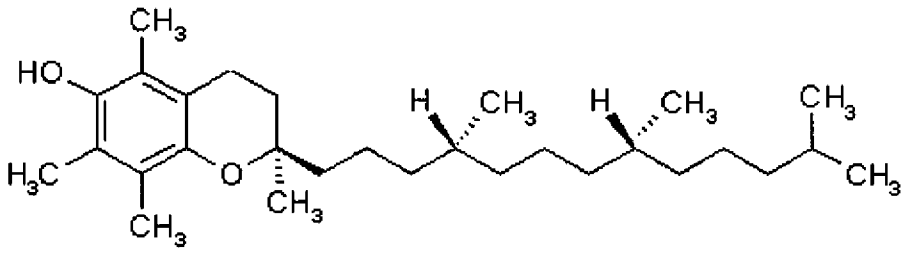
References

Propyl gallate	
	
IUPAC name	
Propyl 3,4,5-trihydroxybenzoate	
Other names	
Gallic acid, propyl ester *N*-Propyl gallate E310	
Identifiers	
CAS number	121-79-9 ✓
PubChem	4947
EC number	204-498-2
MeSH	Propyl+Gallate
SMILES	CCCOC(=O)C1=CC(=C(C(=C1)O)O)O
Properties	
Molecular formula	$C_{10}H_{12}O_5$
Molar mass	212.20 g/mol
Appearance	White crystalline powder
Melting point	150 °C
Boiling point	Decomposes
✓ (what is this?) (verify) (http://en.wikipedia.org/w/index.php?title=Propyl_gallate&diff=cur&oldid=292348060) Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)	
Infobox references	

File:RRR alpha-tocopherol.png

From Wikipedia, the free encyclopedia

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- File history
- File links
- Global file usage



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Summary

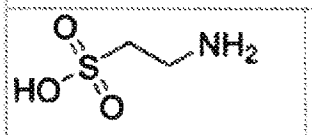
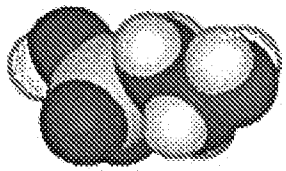
Description	**English:** The RRR stereoisomer of alpha-tocopherol (vitamin E)
Date	
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Taurine

From Wikipedia, the free encyclopedia

Taurine, or **2-aminoethanesulfonic acid**, is an organic acid. It is a major constituent of bile and can be found in the lower intestine and, in small amounts, in the tissues of many animals, including humans.[1][2] Taurine is a derivative of the sulfur-containing (sulfhydryl) amino acid cysteine. Taurine is one of the few known naturally occurring sulfonic acids.

Taurine	
	
	
IUPAC name	
2-aminoethanesulfonic acid	
Other names	
tauric acid	
Identifiers	
CAS number	107-35-7 ✓
PubChem	1123
ChemSpider	1091
IUPHAR ligand	2379
SMILES	NCCS(=O)(O)=O
Properties	
Molecular formula	$C_2H_7NO_3S$
Molar mass	125.15 g mol^{-1}
Density	1.734 g/cm^3 (at ~173.15 °C)
Melting point	305.11 °C
Acidity (pK_a)	<0, 9.06
✓ (what is this?) (verify) (http://en.wikipedia.org/w/index.php?title=Taurine&diff=cur&oldid=307971203) Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)	
Infobox references	

Contents

- 1 History
- 2 Biosynthesis
- 3 Chemical synthesis and commercial production
- 4 In human nutrition
 - 4.1 Physiological functions
- 5 Average daily consumption from food
- 6 Energy drinks
- 7 Other uses
- 8 Toxicity
- 9 In animal nutrition
- 10 See also
- 11 References

History

Taurine is named after the Latin *Taurus* (a cognate of the Greek *ταύρος*) which means bull or ox, as it was first isolated from ox bile in 1827 by German scientists Friedrich Tiedemann and Leopold Gmelin.[3] In the strict sense, it is not an amino acid, as it lacks a carboxyl group,[4] but it is often called one, even in scientific literature.[5][6][7] It does contain a sulfonate group and may be called an amino sulfonic acid. Small polypeptides have been identified which contain taurine, but to date no aminoacyl tRNA synthetase has been identified as specifically recognizing taurine and capable of incorporating it into a tRNA.[8]

Ascorbic acid

From Wikipedia, the free encyclopedia

Ascorbic acid is a sugar acid with antioxidant properties. Its appearance is white to light-yellow crystals or powder, and it is water-soluble. One form of ascorbic acid is commonly known as vitamin C. The name is derived from *a-* (meaning "no") and *scorbutus* (scurvy), the disease caused by a deficiency of vitamin C. In 1937 the Nobel Prize for chemistry was awarded to Walter Haworth for his work in determining the structure of ascorbic acid (shared with Paul Karrer, who received his award for work on vitamins), and the prize for Physiology or Medicine that year went to Albert Szent-Györgyi for his studies of the biological functions of L-ascorbic acid. At the time of its discovery in the 1920s, it was called **hexuronic acid** by some researchers.[2]

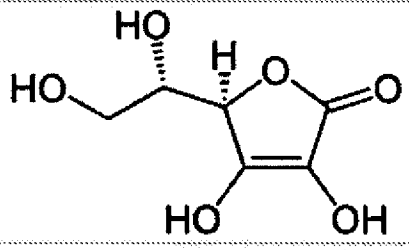
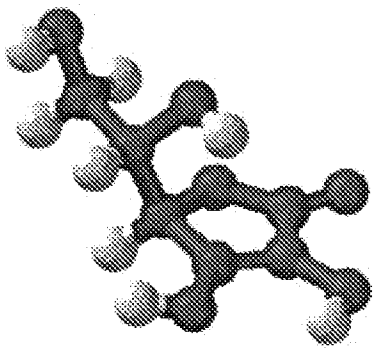
Contents

- 1 Chemistry
 - 1.1 Acidity
 - 1.2 Tautomerism
 - 1.3 Determination
- 2 Antioxidant mechanism
- 3 Uses
- 4 Ascorbic acid synthesis in living organisms
- 5 Compendial status
- 6 See also
- 7 Notes and references
- 8 Further reading
- 9 External links

Chemistry

Acidity

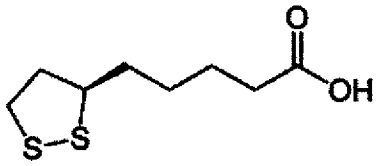
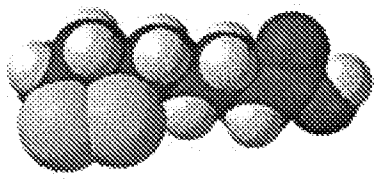
Ascorbic acid behaves as a vinylogous carboxylic acid where the electrons in the double bond, hydroxyl group lone pair, and the carbonyl double bond form a

L-Ascorbic acid	
	
	
IUPAC name	
(5*R*)-[(1*S*)-1,2-dihydroxyethyl]-3,4-dihydroxyfuran-2(5*H*)-one	
Other names	
Vitamin C	
Identifiers	
CAS number	50-81-7 ✓
PubChem	5785
ChemSpider	17206850
EC number	200-066-2
ATC code	A11GA01 (http://www.whocc.no/atc_ddd_index/?code=A11GA01)
SMILES	OC=1C(OC(=O)C=1O)[C@@H](O)CO
InChI	1/C6H8O6/c7-1-2(8)5-3(9)4(10)6(11)12-5/h2,5,7-10H,1H2/t2-,5?/m0/s1
InChI key	CIWBSHSKHKDKBQ-SZSCBOSDBY
Properties	
Molecular formula	$C_6H_8O_6$
Molar mass	176.12 g mol^{-1}
Appearance	White or light yellow solid
Density	1.65 g/cm^3

Lipoic acid

From Wikipedia, the free encyclopedia

Lipoic acid (LA) is an organosulfur compound derived from octanoic acid. LA contains two vicinal sulfur atoms (at C6 and C8) attached via a disulfide bond and is thus considered to be oxidized (although either sulfur atom can exist in higher oxidation states). The carbon atom at C6 is chiral and the molecule exists as two enantiomers R-(+)-lipoic acid (RLA) and S-(-)-lipoic acid (SLA) and as a racemic mixture R/S-lipoic acid (R/S-LA). Only the R-(+)-enantiomer exists in nature and is an essential cofactor of four mitochondrial enzyme complexes.[2] Endogenously synthesized RLA is essential for life and aerobic metabolism. Both RLA and R/S-LA are available as over-the-counter nutritional supplements and have been used nutritionally and clinically since the 1950s for a number of diseases and conditions.

Lipoic acid	
	
	
IUPAC name	
(*R*)-5-(1,2-dithiolan-3-yl)pentanoic acid	
Other names	
α-lipoic acid (alpha lipoic acid), thioctic acid, 6,8-dithiooctanoic acid	
Identifiers	
CAS number	1200-22-2 ✓
PubChem	6112
MeSH	Lipoic+acid
SMILES	OC(=O)CCCC[C@@H]1CCSS1
Properties	
Molecular formula	$C_8H_{14}O_2S_2$
Molar mass	206.33 g/mol
Appearance	yellow needle-like crystals
Solubility in water	sodium salt is readily soluble in water
Pharmacology	
Bioavailability	30% (oral)[1]
Related compounds	
Related compounds	Lipoamide Asparagusic acid
✓ (what is this?) (verify) (http://en.wikipedia.org/w/index.php?title=Lipoic_acid&diff=cur&oldid=266572218) Except where noted otherwise, data are given for materials in their standard state (at 25 °C, 100 kPa)	
Infobox references	

The relationship between endogenously synthesized (enzyme–bound) RLA and administered "free" RLA or R/S-LA has not been fully characterized but "free" plasma and cellular levels increase rapidly after oral consumption or intravenous injections. "Lipoate" is the conjugate base of lipoic acid, and the most prevalent form of LA under physiological conditions. Although the intracellular environment is strongly reducing, both free LA and its reduced form, dihydrolipoic acid (DHLA) have been detected within cells after administration of LA. Most endogenously produced RLA is not "free", because octanoic acid, the precursor to RLA, is attached to the enzyme complexes prior to enzymatic insertion of the sulfur atoms. As a cofactor, RLA is covalently attached via an amide bond to a terminal lysine residue of the enzyme's lipoyl domains. One of the most studied roles of RLA is as a cofactor in aerobic metabolism, specifically the pyruvate dehydrogenase complex (PDC or PDHC). Endogenous (enzyme-bound) R-lipoate also participates in transfer of acyl groups in the α-keto-glutarate dehydrogenase complex (KDHC or OGDC) and the branched-chain oxo acid dehydrogenase complex (BCOADC). RLA transfers a methylamine group in the glycine cleavage complex (GCV). RLA serves as co-factor to the acetoin dehydrogenase complex (ADC) catalyzing the conversion of acetoin (3-hydroxy-2-butanone) to

c. Phenol Definition

c. Phenol Definition

Phenol

From Wikipedia, the free encyclopedia

See also: Phenols

Phenol, also known as **carbolic acid**, is an organic compound with the chemical formula C_6H_5OH. It is a white, crystalline solid. This functional group consists of a phenyl, bonded to a hydroxyl (-OH). It is produced on a large scale (about 7 billion kg/year) as a precursor to many materials and useful compounds.[1] It is a mildly acidic compound that requires careful handling.

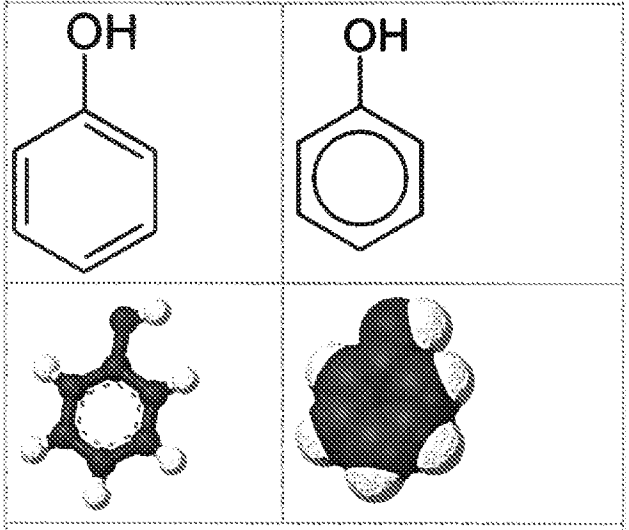
Contents

- 1 Phenols
- 2 Properties
 - 2.1 Acidity
 - 2.1.1 Phenoxide anion
 - 2.1.2 Tautomerism
 - 2.2 Reactions
- 3 Production
- 4 Uses
 - 4.1 Niche uses
- 5 History
 - 5.1 Second World War
- 6 Occurrence
- 7 Toxicity
- 8 See also
 - 8.1 External links
- 9 References

Phenols

Main article: Phenols

The word *phenol* is also used to refer to any compound that contains a six-membered aromatic ring, bonded directly to a hydroxyl group (-OH). In effect, phenols are a class of organic compounds of which the phenol discussed in this article is the simplest member.

Phenol	
	
IUPAC name	
Hydroxybenzene	
Other names	
Carbolic Acid, Benzenol, Phenylic Acid, Hydroxybenzene, Phenic acid, Phenyl alcohol	
Identifiers	
CAS number	108-95-2
ChemSpider	971
RTECS number	SJ3325000
SMILES	Oc1ccccc1
InChI	1/C6H6O/c7-6-4-2-1-3-5-6/h1-5,7H
Properties	
Molecular formula	C_6H_6O
Molar mass	94.11 g mol^{-1}
Appearance	White Crystalline Solid
Density	1.07 g/cm³
Melting point	40.5 °C, 314 K, 105 °F
Boiling point	181.7 °C, 455 K, 359 °F
Solubility in water	8.3 g/100 ml (20 °C)
Acidity (pK_a)	9.95

Category:Phenols

From Wikipedia, the free encyclopedia

*The main article for this category is **Phenols**.*



Wikimedia Commons has media related to: ***Phenols***

Phenols are aromatic compounds with a hydroxyl functional group. The chemistry of the hydroxyl group in this chemical environment is substantially different than those found in alcohols.

(previous 200) (next 200)

Subcategories

This category has the following 5 subcategories, out of 13 total.

B

- [+] Benzenediols (1 C, 109 P)
- [×] Benzenehexols (1 P)
- [×] Benzenetetrols (2 P)
- [×] Benzenetriols (9 P)

C

- [×] Capsaicinoids (7 P)

Pages in category "Phenols"

The following 195 pages are in this category, out of 548 total. This list may not reflect recent changes (learn more).

*

- Phenols
- Phenol

4

- 4-HO-AMT
- 4-HO-DET
- 4-HO-DPT
- 4-HO-DiPT
- 4-HO-MET

B cont.

- Biochanin A
- 4,4'-Biphenol
- Bisoctrizole
- Bisoxatin
- Bisphenol
- Bisphenol A
- Bisphenol AF
- Bisphenol S
- Bithionol
- Boldine

C cont.

- Chloroxylenol
- Chlorquinaldol
- Chromotropic acid
- Cicletanine
- Ciramadol
- Clioquinol
- Clofoctol
- Clopidol
- Coelenterazine
- Combretastatin

- 4-HO-MiPT

7

- 7-OH-DPAT

8

- 8-OH-DPAT
- 8-OH-PBZI

A

- A-41988
- AM-087
- AM-4030
- AM-411
- AM-855
- AM-905
- AM-906
- AM-919
- AM-938
- AM404
- AMG-1
- AMG-3
- AMG-36
- AMG-41
- Abunidazole
- Acetarsol
- Afimoxifene
- Ajulemic acid
- Akuammine
- Alazocine
- Alkylphenol
- Alpha-Methylserotonin
- Alpinumisoflavone
- Alvimopan
- Amidol
- 2-Aminophenol
- 3-Aminophenol
- 4-Aminophenol
- Ammelide
- Ammeline
- Amodiaquine
- Amoxicillin
- Anthrapurpurin
- Apocynin
- Bremazocine
- Bromochlorosalicylanilide
- Bromocresol green
- Bromocresol purple
- Bromophenol blue
- Bromothymol blue
- Bromoxynil
- BU-48
- Bufotenin
- Bulbocapnine
- Buphenine
- Buprenorphine
- Butin (molecule)
- Butorphanol
- Butylated hydroxyanisole
- Butylated hydroxytoluene
- 4-tert-Butylcatechol
- Butylparaben
- BW373U86

C

- CGP-7930
- CP 55,244
- CP 55,940
- Calcein
- Calmagite
- Calphostin
- Calphostin C
- Calycosin
- Camostat
- Cannabichromene
- Cannabicyclohexanol
- Cannabicyclol
- Cannabinol
- Cannabivarin
- Carbaryl
- Carbofuran
- Carbol fuchsin
- Cardanol
- Carubicin
- Carvacrol
- Cavicularin
- Cefadroxil
- Cefatrizine
- Cefoperazone
- Cefprozil
- Cephaeline
- Chavicol
- Coumaric acid
- Coumatetralyl
- CP 47,497
- Creosol
- Cresol
- Cresol Red
- M-Cresol
- O-Cresol
- P-Cresol
- Cyclazocine
- Cyclorphan
- Cyprenorphine

D

- DPI-287
- DPI-3290
- Daidzein
- Daidzin
- Dalbergichromene
- Dauricine
- Deferasirox
- Denopamine
- Derrubone
- Desaspidin
- O-Desmethyltramadol
- Desomorphine
- Desoxyfructo-serotonin
- Desvenlafaxine
- Dexanabinol
- Dextrorphan
- Dezocine
- 2,6-Di-tert-butylphenol
- Dianin's compound
- Dichlorophen
- Dichlorophene
- Dichlorophenol
- 2,4-Dichlorophenol
- 2,6-Dichlorophenol
- Dienestrol
- Diethylamino hydroxybenzoyl hexyl benzoate
- Diethylstilbestrol
- Diferulic acids
- Dihydroetorphine
- Dihydromorphine
- 2,5-Dihydroxy-1,4-benzoquinone
- 5,8-Dihydroxy-1,4-naphthoquinone

- Apomorphine
- Aquayamycin
- Arbidol
- Arbutin
- Arzoxifene
- Atovaquone
- Aurin
- Azidomorphine
- Chloranilic acid
- Chlornaltrexamine
- 2-Chloro-m-cresol
- P-Chlorocresol
- Chloroethylnorapomorphine
- Chloromorphide
- Chlorophenol
- Chlorophenol red
- 2-Chlorophenol
- 1,8-Dihydroxyanthraquinone
- 4,4'-Dihydroxybenzophenone
- Dihydroxyphenylglycine
- 2,6-Dihydroxypyridine
- Diiodohydroxyquinoline
- Diloxanide furoate
- 2,4-Dimethyl-6-tert-butylphenol
- 4-Dimethylaminophenol
- Dimethylheptylpyran
- Dinapsoline
- 2,4-Dinitrophenol

B

- BRL-54443
- BSPP (drug)
- Bamethan
- Bazedoxifene
- Bemotrizinol
- Benserazide
- Benzbromarone
- Benziodarone
- Benzyl salicylate
- Berbamine
- 1,1'-Bi-2-naphthol
- Biclotymol

(previous 200) (next 200)
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Categories: Alcohols | Aromatic compounds

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X. RELATED PROCEEDINGS APPENDIX (37 CFR 41.37 (c)(1)(x))

Appeal Brief to be filed in continuation application 11/710,228. No decision has been rendered.

XI. A COPY OF A CLAIM AMENDMENT SUBMITTED UNDER 37 CFR 41.33 (a)

This attached Amendment was submitted Sept 16, 2010.

Electronic Acknowledgement Receipt

EFS ID:	8435680
Application Number:	09748748
International Application Number:	
Confirmation Number:	4503
Title of Invention:	Polyhydroxylated aromatic compounds for the treatment of amyloidosis and alpha-synuclein fibril diseases
First Named Inventor/Applicant Name:	Gerardo M. Castillo
Customer Number:	74651
Filer:	Rebecca Eagen
Filer Authorized By:	
Attorney Docket Number:	P25US2
Receipt Date:	16-SEP-2010
Filing Date:	26-DEC-2000
Time Stamp:	16:54:17
Application Type:	Utility under 35 USC 111(a)

Payment information:

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1	Amendment after Notice of Allowance (Rule 312)	afterNOAppealamendment.pdf	218255 54e63b33636dff4168d4e65134f1bd0ce5d7 8164	no	5

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New Applications Under 35 U.S.C. 111
If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.

National Stage of an International Application under 35 U.S.C. 371
If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.

New International Application Filed with the USPTO as a Receiving Office
If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant	: Gerardo Castillo *et al.*	Art Unit	: 1612
Serial No.	: 09/748,748	Examiner	: Zohreh Fay
Filed	: December 26, 2000	Conf. No.:	4503
		Attorney Docket No:	P25US2

Title : POLYHYDROXYLATED AROMATIC COMPOUNDS FOR THE TREATMENT OF AMYLODOSIS AND ALPHA-SYNUCLEIN FIBRIL DISEASES

September16, 2010

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

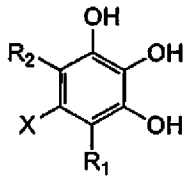
AMENDMENT SUBMITTED UNDER 37 CFR 41.33(a) TO PLACE CLAIMS IN BETTER FORM FOR APPEAL

The enclosed Claim Amendments for the above identified patent application is being submitted prior to the submission of an Appeal Brief as per 37 CFR 41.33(a). The claims have been amended to present the rejected claims in better form for appeal.

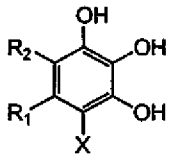
Listing of Claims begins on page 2.

Listing of Claims:

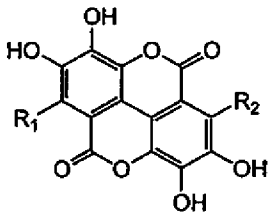
1. (Currently amended) A method of treating Alzheimer's disease, in a mammal suffering there from, comprising administration to the mammal of a therapeutically effective amount of an isolated pure compound selected from the group consisting of the compounds of formula A, formula B, and formula D:



Formula A



Formula B



Formula D

where:

R_1 and R_2 are independently selected from hydrogen, halogen, C_{1-6} alkyl and C_{1-6} alkoxy;

X is selected from hydrogen and the group consisting of

(a) hydroxy, amino, C_{1-6} alkylamino, di(C_{1-6} alkyl)amino, and cycloamino,

(b) C_{1-22} alkyl, C_{1-22} alkoxy, C_{1-22} alkylthio, and C_{1-22} alkylcarboxyl, each optionally substituted with 1 to 5 moieties selected from the group consisting of halogen, hydroxy, mercapto, amino, nitro, C_{1-6} alkoxy, C_{1-6} alkylthio, and C_{1-6} alkylcarboxyl,

(c) aromatic and heteroaromatic groups substituted with 3 adjacent hydroxy groups, and optionally substituted with 1 to 5 substituents selected from halogen, C_{1-6} alkyl and C_{1-6} alkoxy, each optionally substituted with up to 5 halogen atoms,

(d) sugars, optionally substituted with one or more anionic groups selected from sulfate, phosphate, phosphonate, carboxylate, and sulfonate groups, and

(e) peptides and

~~Y is hydrogen, hydroxy, C_{1-6} alkoxy, benzyloxy, where the phenyl group is optionally substituted with 1 to 3 substituents selected from halo and C_{1-6} alkyl, or $-OSO_2R_4$, where R_4 is C_{1-6} alkyl or phenyl optionally substituted with 1 to 3 substituents selected from halo and C_{1-6} alkyl;~~

~~and the group of compounds consisting of acacetin, actinorhodine, alizarin, alizarin blue, alizarin orange, alizarinsulfonic acid, alkannin, anthragallol, anthralin, anthrarobin, antharufin, apigenin,~~

~~apigetrin, apiose, baicalein, baptigenin, 1,2,4 benzenetriol, bostrycoidin, carbidopa, carminic acid, carubicin, cellobiose, centaurein, chloranilic acid, chondrosine, chromotrope 2B, chromotropic acid, chrysamminic acid, chrysarobin, chrysin, chrysophanic acid, cichoriin, citrazinic acid, citromycetin, collinomycin, curvularin, cyanidin, cyanidin 3-glucoside, cyanidin 3-rhamnoglucoside, cyanidin 3,5-diglucoside, cyanidin 3-sophoroside, daphnetin, datiscetin, daunorubicin, delphinidin, deoxyepinephrine, diosmetin, diosmin, dioxethedrine, dopa, dopamine, doxorubicin, droxidopa, echinochrome A, embelin, emodin, ergoflavin, eriodictyol, esculetin, fenoldopam, fomecin A, fomecin B, fraxetin, fraxin, fredericamycin A, fumigatin, fusarubin, fuscin, fustin, galangin, gallein, gallocyanine, gardenin A, gardenin B, gardenin C, gardenin D, gardenin E, gentisin, granaticin, guamecycline, hematein, hydroxysophorobioside, hydroxysophoricoside, icariin, isoquercitrin, kermesic acid, laccaic acid A, laccaic acid B, laccaic acid C, laccaic acid D, leucocyanidin, luteolin, maclurin, menogaril, methylenedigallic acid, morin, oosporein, phenicin, phloroglucide, puberulic acid, puberulonic acid, purpurin, purpurogallin, quercetagetin, quercimritrin, quinalizarin, quinic acid, resistomycin, rhamnetin, rhein, rhodizonic acid, rhodomycin A, rhodomycin B, robinin, ruberythric acid, rufigallol, rutin, scutellarein, tannic acid, tetroquinone, tiron, troxerutin, and tunichrome B1,~~ but excluding pyrogallol, and

the pharmaceutically acceptable salts thereof.

2. (Previously presented) The method of Claim 1 where only one active ingredient compound is administered.

3. (Previously presented) The method of Claim 1 where the mammal is a human.

4-16. (Canceled).

17. (Previously presented) The method of Claim 1 where R_1 and R_2 are independently selected from the group consisting of hydrogen; C_{1-6} alkyl, C_{1-6} alkoxy, and C_{1-6} alkylthio, in each of which the alkyl group is optionally substituted with 1 to 5 halogen atoms; and halo.

18. (Previously presented) The method of Claim 1 where X is selected from hydrogen and the group consisting of

(a) hydroxy, amino, C_{1-6} alkylamino, di(C_{1-6} alkyl)amino, and cycloamino,

(b) C_{1-22} alkyl, C_{1-22} alkoxy, C_{1-22} alkylthio, and C_{1-22} alkylcarboxyl, each optionally substituted with 1 to 5 moieties selected from the group consisting of halogen, hydroxy, mercapto, amino, nitro, C_{1-6} alkoxy, C_{1-6} alkylthio, and C_{1-6} alkylcarboxyl, and

(c) aromatic and heteroaromatic groups substituted with 3 adjacent hydroxy groups, and optionally substituted with 1 to 5 substituents selected from halogen, C_{1-6} alkyl and C_{1-6} alkoxy, each optionally substituted with up to 5 halogen atoms.

19. (Previously presented) The method of Claim 1 where X is selected from hydrogen and the group consisting of hydroxyl and amino.

20. (Canceled)

21. (Previously presented) The method of Claim 1 where the compound is a compound of formula A or formula B, or a pharmaceutically acceptable salt thereof.

22-24. (Canceled)

25. (Previously presented) The method of Claim 1 where the compound is a compound of formula D or a pharmaceutically acceptable salt thereof.

26. (Canceled)

27-28. (Canceled)

29. (Canceled)

30. (Canceled)

REMARKS

Claims 1-3, 17-19, 21, and 25 will be pending following entry of this amendment. Claim 1 is amended to remove reference to subject matter related to previously cancelled subject matter and to remove reference to the list of individual compounds. By this amendment dependant Claims 20, 26, 29 and 30 are canceled. No new matter has been added.

Applicant respectfully requests entry of the amended claims now in better form for review by the Board of Appeals. It is believed that no fee is required for this amendment, however should a fee be necessary please deduct it from our USPTO deposit account #50-4423.

Respectfully submitted,



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